

**NEED FOR ASSISTANCE***Background Information*

Located in a geographic region on the southeastern tip of Florida, Miami-Dade County encompasses 2,431 square miles, making the County larger than the state of Rhode Island. It is Florida's largest county, with a population larger than 15 states, and the seventh largest county in the United States. The County also has the highest immigration share of total population of any metropolitan area in the country (U.S. Census Bureau 2016). In fact, at 51 percent, Miami-Dade is the only county in the United States with the majority of its residents born outside of the U.S. The County has a total population of 2,693,117 with 66 percent Hispanic; 18 percent Black; 14 percent White; and 2 percent other, with the largest gap nationally between the rich and the poor (U.S. Census Bureau 2016).

Miami-Dade County Public Schools' (M-DCPS) singular goal, as identified in *Vision 20/20*, the District's Strategic Blueprint for 2015-2020, emphasizes student achievement and encompasses every student having a post-secondary education and career plan to succeed in an evolving and fast moving, highly technological global society, with its increasing emphasis on Science, Technology, Engineering, and Mathematics (STEM). Accomplishing this task requires calling upon all available resources as the District strives to close two achievement gaps—the gaps between District students and students across the state and nation, and the gaps across District demographic groups. This effort is made challenging by current local demographics. If trends for the last five years continue, as reported by the American Community Survey (ACS) 2015, Miami-Dade will have higher poverty rates, especially among children, and fewer children will speak English at home. According to a study by the Brookings Institute on *The Intersection of Race, Place, and Multidimensional Poverty* (2016) the share of people in Miami who are

disadvantaged by a combination of low income, lack of educational attainment, and living in a poor community will increase. Currently, the poverty rate in Miami for all people is 20.4 percent; the poverty rate for children is 27.7 percent, with 71.9 percent Economically Disadvantaged (ED), as defined by eligibility for free/reduced lunch. The percent of adults not having a high school diploma is Minorities 22.9 percent, and Whites 4.9 percent. According to the same study, the percent of those who are disadvantaged by a combination of multiple factors is: Black 28.5 percent, Latino 23.5 percent and White 10.6 percent. Although the District has made gains toward the goal of achieving a 90 percent graduation rate by 2020, progress toward the goal may be hampered by poverty. Graduation rates and poverty rates were analyzed in a study completed by researchers at University of Florida and Auburn University, and through Correlation Analysis (bivariate analysis). The result of the study by Baydu, Kaplan, and Bajar (2013) indicates that there is a negative moderate association between high school graduation and poverty rates ( $r = -0.530$ ). This, coupled with statistics that indicate that graduation rates are lower for minority groups, highlights the fact that there is much work yet to be done. Although according to MPR Associates, an educational research firm, graduation rates in Florida have risen among Black and Hispanic students in the past five years; the graduation gap for M-DCPS students stands at 14% for Blacks, and 8% for Hispanics as compared to White students. (Florida Department of Education 2016)

Equity in access is a crucial issue, and therefore, the cornerstone of the design approach to implementation of the *STEM Pathways Project* initiative, an unwavering focus on providing STEM-related experiences that appeal to students of all backgrounds. “To succeed in this new information-based and highly technological society, all students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past.”

(National Science Foundation 2007) The lack of gender and ethnic diversity of students entering STEM educational programs and career fields presents additional challenges. The Report of the Committee on Equal Opportunities in Science and Engineering to the United States Congress (2011) echoes this concern: “There are students...with enormous potential to become our future STEM leaders. Regrettably, far too many of our most able students are neither discovered, nor developed, particularly those who have not had access to education resources. More needs to be done in terms of identifying, recruiting, motivating, educating, and retaining underrepresented groups for the next generation of American scientists and engineers.” Using creativity and innovation to address the challenge of providing access to a 21<sup>st</sup> Century education to all students is critical, and M-DCPS is committed to meeting both this challenge, and the challenges of improving student achievement and the quality of teaching and learning district-wide.

### **M-DCPS Population/Demographics**

M-DCPS is the largest school district in Florida, with a student body that reflects the diversity of South Florida. The challenge of preparing the County’s multicultural student population for academic success is severely exacerbated by high incidences of poverty, as detailed above, as well as many English learners. The District’s student population speaks 56 different languages and represents 160 countries. Fully 72 percent speak a language other than English at home, and 19.1 percent are enrolled in English for Speakers of Other Languages (ESOL) classes (M-DCPS).

Currently, the District aspires to create an opportunity for students from across Miami-Dade County to enroll at three rigorous STEM-focused schools, one elementary and two high schools, with multiple strands that will set high expectations for their participation and performance, and prepare them for success in college and careers, regardless of any past

academic performance. Without grant funding, the District will be unable to execute the project’s innovative, forward-looking curricula at the proposed schools that would have a high success rate and prepare students on STEM pathways to college and careers in local, national and international STEM industries. The right academic systems are needed to get students the necessary skills for these opportunities. According to the Beacon Council, Miami is ready to fill the more than 9,500 new STEM-specific jobs projected to be created every year through 2019. To this end, Miami-Dade educators community groups and governments have the opportunity to work with the business community to develop programs that will close the skills gap and create meaningful career paths that will help more students achieve prosperity.

Miami is one of the first communities with an Academic Leaders Council; all local colleges and the Superintendent of M-DCPS meet regularly with industry committees to align respective efforts toward designing academic programs that the research proves are needed by modern STEM-focused industries. Meeting the needs of a diverse population of students will require revenue that has not been appropriated by the state to develop these programs; grant funds will provide the path to create these robust programs.

**NEED FOR ASSISTANCE**

a) *The costs of fully implementing the magnet schools project as proposed.*

The cost to fully implement the *STEM Pathways Project* would be \$15 million. The District does not have the funds or the resources to initiate/implement this project. MSAP funds will be used to develop the highly specialized STEM-focused curriculum; hire teachers with strong preparation in STEM fields and mastery of the skills to teach the subjects; provide targeted professional development to enhance the skills of staff; implement an aggressive

marketing plan to attract students from diverse backgrounds; provide transportation to accommodate students living outside the school boundary, attracting underrepresented students from targeted neighborhoods; attract partners who will support curriculum development, professional development and real-world STEM experiences for students; and purchase sophisticated technology, supplies, and materials vital to the instructional programs proposed. Additionally, grant funds will support an extended period day at the two high schools that will serve to eliminate a barrier to access for students who have not attained a minimum level of proficiency in reading and/or mathematics on state assessment exams. The State currently requires these students to be “double-dosed” in the class(es) in which they lack proficiency. For a high school on a traditional six-period class schedule, this can reduce or eliminate their opportunity to participate in magnet-themed coursework. To successfully implement the magnet programs proposed by this project, additional funding is necessary (as detailed in the *Budget Narrative*).

**NEED FOR ASSISTANCE**

*b) The resources available to the applicant to carry out the project if funds under the program were not provided.*

If funds under the program were not provided, the District would not be able to launch the proposed schools. District funding traditionally supports only the infrastructure of facilities; standard furniture and basic equipment; and the salaries and benefits of classroom teachers, administrative staff, and general support staff. While the School Choice & Parental Options Office’s (SCPO) budget is adequate to maintain magnet school funding for sustaining the current 111 District magnet schools, the budget is insufficient to initiate this project. The District lacks the funds to develop the highly specialized curriculum, support the strong content-specific

pedagogical teacher preparation, or purchase the sophisticated technology and equipment necessary to make these STEM schools a reality. At the school level, the infrastructure is available, as is human capital, with the exception of specialized magnet content area teachers and the lead teachers. However, after implementation of the grant it is expected that the increase in each school's enrollment will generate Full Time Equivalency (FTE) to sustain the costs of these personnel.

**NEED FOR ASSISTANCE**

*c) The extent to which the costs of the project exceed the applicant's resources.*

Although the per pupil spending in Florida for 2015-2016 has been reported at \$7,178.49 per pupil, the highest in Florida history, this amount is still well below the national average. Currently, the state ranks 44<sup>th</sup> in the country in per pupil spending, while the national average of per pupil spending is \$12,357 ([http://www.nea.org/assets/docs/NEA\\_Rankings\\_And\\_Estimates-2015-03-11a.pdf](http://www.nea.org/assets/docs/NEA_Rankings_And_Estimates-2015-03-11a.pdf)). Additionally, a change in the state funding formula actually *reduced* the per pupil allocation because the Florida Legislature eliminated a cost of living differential that the District had historically received due to the disproportionate expense of educating children, particularly due to the large percentage of English language learners, in this large metropolitan area. The outcome of this decision amounted to a decrease in revenue of more than \$1 billion since 2005. The impact to per pupil expenditures is dramatic. The District's total expenditure per pupil is well below that of other large school districts, including New York, Chicago, Philadelphia, and Detroit. Moreover, 10 percent of the student population is categorized as special needs under Exceptional Student Education. The District's student body is the most diverse in Florida; 208,020 students report a language other than English as their primary

language. Given the level of per student allocation, meeting the needs of this diverse population represents a great funding challenge. Furthermore, the implementation of the state constitutional amendment to limit class size, known as the Class Size reduction Amendment, continues to pose an additional challenge to the District. Although overwhelmingly passed by Florida voters in 2002, the legislature has consistently under-funded this amendment—it does not include facilities funds—and consequently passed on the additional costs to each school district. The Class Size Reduction Amendment has cost the District hundreds of millions of dollars, further affecting instructional funding. These reductions, from building and supplying new classrooms, to hiring new teachers, greatly reduced school-based discretionary budgets, funds that provide principals with the means to sustain operational costs.

**NEED FOR ASSISTANCE**

*d) The difficulty of effectively carrying out the approved plan and the project for which assistance is sought, including consideration of how the design of the magnet schools project impacts the applicant's ability to carry out the approved plan successfully.*

Effectively carrying out the approved plan for each of the high-tech STEM magnet programs, with a potential impact on a projected 4,297 students from all around the county at full implementation, will be difficult, given the necessity for extensive program development; high-quality professional development; extended transportation costs; high-end technology, equipment, software, and supplies; and specialized magnet-themed curriculum materials, which are all costly expenditures. Conducting professional development activities at the three schools with multiple themes will also be a costly endeavor, both in terms of staff time and fiscally.

Opening two high-tech STEM high schools and one elementary school with a research campus at the Zoo Miami partner site will also require the District, for the first two years of the

grant, to hire nine magnet-themed content-area teachers who are highly skilled and qualified within the identified themes. In addition, all three schools will require full-time lead teachers for the first three years of implementation. Historically, lead teachers have been essential in jump-starting new magnets, particularly those that are created in hard to sell urban areas.

The combined expenses essential to startup, paired with the challenges of implementing innovative STEM curriculum, as well as the cost of transporting students from outside the school boundary in a county that is larger than the state of Rhode Island, would make it impossible for M-DCPS to implement these programs without MSAP funding. With grant funding, however, the District will be able to address these challenges and remain true to the goals outlined in the District's *Vision 20/20* strategic plan, and in this application. Facing the implementation and operation of these schools comes with both challenges and opportunities. Implementation with fidelity is a goal shared with many of our partners, both in higher education and in our local business community. If we are to meet the community's needs for more skilled workers in high growth industries; if we are committed to contributing to a better quality of life for families; and if we are committed to the economic growth of Miami; we must take the next steps toward developing programs that will make all students college and career ready, and that create pathways that help students forge meaningful career pathways and achieve prosperity. Our partners are already forging the way with real-life STEM experiences in the classroom, through field experiences offered at colleges and universities, and through internships at worksites.

Our plan will require a long-term commitment from the District after the grant ends, including activities normally handled for our schools at the District level such as contracted services, e.g. ongoing professional learning for teachers; procurement services; travel; and marketing and targeted recruitment, including printing and media services, to ensure

sustainability of these programs, and equal access for all.

M-DCPS has a history since 1970 of successfully opening and supporting magnet schools, and of seeking funding from numerous sources, both public and private. Building upon our long history of implementing magnet schools, M-DCPS is committed to opening and sustaining three rigorous and relevant STEM schools with the assistance of MSAP funding.

**EVIDENCE OF PROMISE***Citation*

*Sungur, S., Tekkaya, C., & Geban, Ö. (2006). Improving achievement through problem-based learning. Journal of Biological Education, 40(4), 155-160.*

**Type of Study: Correlational Study with Statistical Controls for Selection Bias**

This is a correlational study that contains empirical evidence to support the theoretical linkages between the use of problem/project-based learning (PBL) and increased student achievement as measured by state assessments as presented in the logic model. The study involved sixty-one 10th grade students of mixed genders in two complete classes with the same teacher. Two instructional methods, PBL and traditional biology instruction, were randomly assigned to the classes whereby the PBL group became the experimental group and the traditional biology instruction group, the control. The groups' prior knowledge in the field of biology was assessed and found to be comparable. The lesson topic delivered by both groups related to the excretory system. The study was conducted for a four week period with an equal amount of instruction encompassing four 40-minute periods. The study found a statistically significant and substantively important favorable association between problem/project-based learning and increased student achievement as measured by state assessments. It was determined that "after the treatment, the effect of PBL on students' academic achievement and performance skills [as] determined by conducting one-way MANOVA... showed that there was a significant mean difference between the experimental and the control groups with respect to collective dependent variables of academic achievement and performance skills, Wilks' Lambada = 0.42,  $F(2,56) = 38.57, p = 0.00.$ " (Sungur, p 158). The study utilized an intervention group and a

comparison group to associate differences in outcomes with the intervention while including statistical controls for selection bias.

## EVIDENCE OF PROMISE

### *Outcome of Research Study*

The study investigates the effect of problem-based instruction on student achievement and skill attainment of 10th grade students. The treatment includes a sample of sixty-one 10th grade students, from two full classes instructed by the same biology teacher. Classes were randomly assigned as either the experimental or the control group and were pre- and post-tested to determine their academic achievement and performance skills. The experimental group received problem-based instruction while the control group received traditionally-designed biology instruction. The One-way Multivariate Analysis of Variance results showed that there was no pre-existing difference between two study groups (Sungur, 158) with respect to their previous academic achievement and performance skills. However, as clearly evidenced in table 2 on page 157 of the article, students instructed with problem-based learning earned significantly higher scores than those instructed with traditionally designed biology instruction – in terms of academic achievement and performance skills. The study suggests there was a 58 percent multivariate variance of the dependent variables associated with the treatment, thus suggesting that the magnitude of the difference in Table 2 between the two groups was not small and, therefore, indicating a strong correlation between the use of PBL and academic achievement and performance skills attainment. The study also revealed that students in the experimental group appeared to be more proficient in organizing relevant information and drawing conclusions. The findings show that students in the experimental group were able to use, integrate, and interpret

relevant information, thus engaging in higher-order thinking. These findings were in agreement with the literature. In their meta-analysis, Dochy et al (2003) showed that students engaged in PBL have slightly less knowledge, but remembered more of the acquired knowledge and applied it more efficiently.

## EVIDENCE OF PROMISE

### *Relevance to Proposed Project*

The *STEM Pathways Project's* goals are in direct alignment with the M-DCPS Strategic Plan and are correlated to the goals measured by the Sangur (2006) study. The study analyzes the effect of the implementation of the same intervention proposed in the *STEM Pathways Project* and measures the same outcomes proposed by the project. Ultimately, the *STEM Pathways Project* is testing methods for increasing student achievement while reducing minority isolation, thus closing the achievement gap among minorities and students from low socioeconomic households. To do so, requires that the project team analyze carefully what will be required of students and instructors in order to show an increase in student achievement. With the development and implementation of the new Florida Standards Assessments and End-of-Course examinations, a great emphasis has been placed on assessing students using technology-enhanced test items with multivariate responses that invoke the basic application of skills & concepts coupled with strategic thinking and complex reasoning. In fact, between 70 and 100 percent of the test items will fall within Webb's Depth of Knowledge (DOK) levels 2 and 3. To be successful, students will need to develop complex reasoning skills. It is not enough to know information, but rather, know how to use it effectively. Developing this skill set is what will drive student achievement in a positive direction.

The intervention in the *Sungur, S., Tekkaya, C., & Geban, Ö. (2006)* study demonstrated that Problem-Based Learning (and by association, Project-Based Learning) serves as a channel to direct positive student achievement. A popular strategy for improving outcomes at schools with high concentrations of minorities is to increase the academic rigor by providing more advanced academic classes. However, studies have shown that when those classes have a high concentration of minorities and lack classroom diversity, overall achievement suffers (Giersch 2016). In order to prevent homogeneity, *STEM Pathways Project* schools will implement a teaming strategy among students when developing PBL project teams. By integrating students of varied socioeconomic status and ethnicities into teams, students will be exposed to varied approaches to a common problem or project. Likewise, a diverse collective of students will build upon each other's thoughts to devise solutions to real-world problems, thus increasing their capacity for utilizing information in an efficient and effective manner. Ultimately, students will develop their skill sets in the basic application of skills & concepts coupled with strategic thinking and complex reasoning, thus setting the foundation for demonstrating improved student achievement. This strategy falls in line with priority 2, closing the achievement gap, of M-DCPS' Vision 20/20 Strategic Blueprint, whereby all schools are tasked with increasing the percentage of students scoring at grade level in each individual student sub-group on state assessments by 2 percentage points annually; a goal that the *STEM Pathways Project* schools will be prepared to meet. As evidenced by the project's logic model in the Project Design section, the long-term expected outcomes for all of the proposed schools are in line with the outcomes of the study conducted by Sungur: to increase student achievement by way of incorporating PBL instructional strategies across the curriculum.

**INVITATIONAL PRIORITY: RACIAL & SOCIOECONOMIC INTEGRATION EVIDENCE OF PROMISE**

*The Secretary determines the extent to which the applicant proposes to increase racial integration by taking into account socioeconomic diversity in designing and implementing magnet school programs. Demonstrates a rationale based on high-quality research findings or positive evaluation that such activity, strategy, or intervention is likely to improve student outcomes or other relevant outcomes.*

Miami-Dade County Public Schools proposes a novel plan to increase racial integration by taking into account socioeconomic diversity in designing and implementing the proposed magnet school programs. Traditionally, magnet schools that provide weighted lotteries to increase integration utilize criterion to weight the lottery. The table below identifies a variety of criteria used by magnet schools around the country.

<b>Table 1. Common Magnet Applicant Weighting Criteria</b>		
Racial composition of geographic area	Socioeconomic status of geographic area	Race of student
Socioeconomic status of student	Sibling of enrolled student	Reside in an attendance zone
Reside outside of the attendance zone	Parent/guardian’s place of employment	Magnet theme articulation

*As identified in Table 5: Selection of Students - Competitive Preference 3*

The aforementioned criteria (Table 1) are all dependent upon identifying individual students. However, in an effort to avoid discriminating students based on individualized factors for the purposes of weighting, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This high-quality study was conducted by the project team at M-DCPS and can be referenced in the Selection Criteria: Desegregation section of this application. The application of the District’s correlation research findings as a strategy has a high-probability of increasing enrollment of economically disadvantaged students, thus increasing racial and socioeconomic diversity as proposed in the project’s logic model.

After an exhaustive review of literature, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] There is documented evidence of models in which socioeconomic status (based on free or reduced lunch status) is utilized to provide weighting for applicants applying to charter schools (see Atlanta Neighborhood Charter School, <http://www.atlncs.org>); however, studies have not been conducted to determine the efficacy of such a practice. Furthermore, such a practice would only benefit those students that complete a free or reduced lunch application, thus excluding a subset of the underserved population that would be potential applicants to a school. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

M-DCPS has selected two district-wide magnet schools, in the same geographic regions as the proposed *STEM Pathways Project* schools, that have no entry requirements, utilize targeted marketing strategies to recruit students, and utilize a randomized lottery for the selection

of students. These two schools will serve as a control group against which to compare the effects of weighting applicants based on priority neighborhoods on the total enrollment at a school and thus the degree to which such a treatment increases racial and socioeconomic integration.

**INVITATIONAL PRIORITY: RACIAL & SOCIOECONOMIC INTEGRATION EVIDENCE OF PROMISE**

*The Secretary determines the extent to which the applicant proposes to increase racial integration by taking into account socioeconomic diversity in designing and implementing magnet school programs. Demonstrates ongoing efforts to examine the effects of such activity, strategy, or intervention.*

A current analysis of district-wide magnet schools in Miami-Dade County has revealed shifts in population demographics in a very small number of schools. The proposed method for increasing diversity in this project, if effective, will be implemented as needed across county magnet schools as a means to ensure that socioeconomic and racial isolation is reduced.

Throughout the implementation of the proposed project, District staff will monitor, in an on-going basis, the population demographics at each of the proposed schools. The District will continuously analyze and examine the composition of each school in relation to the overall composition of the received applicants for each school. The variance between the two compositions will be addressed by target marketing in real-time during the application window.

In addition, [REDACTED]

[REDACTED] as per the logic model and the protocol described in the Selection Criteria: Desegregation section of this application. The school district has the resources necessary to conduct the aforementioned analyses. Utilizing a sophisticated, cloud-based student application, lottery and wait list

management system, implemented in the District in 2015, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

## **DESEGREGATION**

*1) The effectiveness of the plan to recruit students from different social, economic, and racial backgrounds into the magnet schools*

### **A. Creating an Effective Plan: Background**

Since the Federal desegregation court order in 1970 that led to Miami-Dade County Public Schools' (M-DCPS) opening of the District's first magnet program at Charles Drew Elementary in 1973, the District has employed school choice as an avenue for reducing minority isolation and closing the achievement gap among children based on their race, ethnicity, or socioeconomic status. Public interest in magnet offerings has steadily increased, due in part to the comprehensive marketing campaign initiated and executed by staff in the office of School Choice and Parental Options (SCPO), and to the innovative programs offered at magnet schools. Applications for the 2017-2018 school year have exceeded 82,000, an increase of more than 6,000 applications in one year.

To date, the District has opened over 380 magnet programs to reduce minority isolation, and continues to explore *effective* methods by which to continually improve upon the reduction of such isolation. Currently, M-DCPS is seeking funding for the *STEM* (Science, Technology, Engineering and Math) *Pathways Project* to address disparities in student enrollment by opening three new district-wide magnet schools, made available to all district students from different social, economic, ethnic, and racial backgrounds on the basis of interest only, with no academic criteria, entrance exam, or auditions.

Recognizing that diverse schools provide immeasurable educational and civic benefits by promoting understanding, breaking down stereotypes, eliminating bias and prejudice, and providing opportunities, [REDACTED]

[REDACTED]

[REDACTED] These practices will be consistent with existing law, the recommendations in *Guidance on the Voluntary Use of Race to Achieve Diversity* from the Office for Civil Rights of the U.S. Department of Education and the Civil Rights Division of the U.S. Department of Justice, and the School Board of Miami-Dade County’s Bylaws and Policies.

Miami-Dade’s elected officials have been well aware of the sharp and increasing social and economic disparities between the county’s often-adjacent neighborhoods. In 1997, Miami-Dade County began producing a [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] According to the report, poverty rates have risen, and social characteristics of the population have been affected. [REDACTED]

[REDACTED]

The most currently available reports on poverty produced by Miami-Dade County's Planning, Research and Economic Analysis Department, [REDACTED]

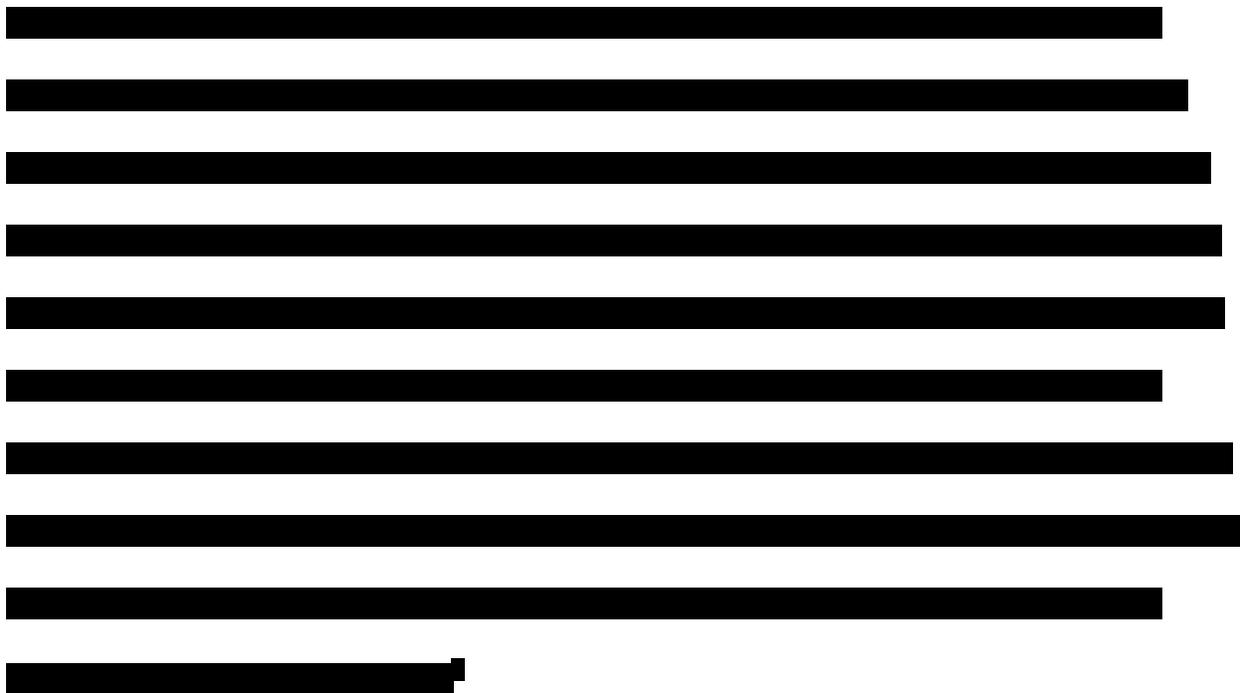


Figure 1: Income and Poverty Rates in Miami-Dade County by Ethnicity

	Median Household Income	Poverty Rate
Black	\$32,044	29%
Hispanic	\$39,674	21%
White	\$64,976	12%



[REDACTED]

**B. Creating an Effective Plan: Management Tools**

[REDACTED]

In 2015-2016, M-DCPS implemented a district-funded online software platform that provides a comprehensive lottery and wait-list management system, to customize and transfer management of the entire magnet admissions process from the school site to the Central office. As a result, the District can centrally facilitate and manage the process of student selection more easily; avoid common pitfalls in the school-based admissions process; eliminate vague or

[REDACTED]

inappropriate admissions criteria; eliminate practices that may be inconsistent with current law, recommendations or policies; assign priorities; produce reports to monitor applicant pools for each school to facilitate the design of additional recruitment efforts in order to provide a probability of meeting minority-group isolation objectives; and centralize long-term planning.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

■ [REDACTED]

[REDACTED]

[REDACTED]

- The percentage of students at each school from each racial and ethnic group;
- The effectiveness of each of the desegregation-related activities;
- [REDACTED]
- [REDACTED]
- The overall effectiveness of the District’s plan to recruit students, achieve diversity, and avoid minority group isolation.

[REDACTED]

[REDACTED]

[REDACTED], with a special emphasis on those who are underrepresented within the magnet

program(s). [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**C. Creating an Effective Plan: The Proposed Priority Plan**

The District’s proposed desegregation plan includes both targeted marketing [REDACTED]  
[REDACTED] Marketing efforts for the proposed schools will be directed at  
neighborhoods that have a [REDACTED] students within  
the targeted age group of the school. Likewise, the proposed plan will give priority weighting  
through a random selection process to student applicants [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

[Redacted text block containing approximately 18 lines of blacked-out content]

[REDACTED]

[REDACTED]

[REDACTED]

correlation between the white subset of the population and poverty rate. In addition, the change in magnitude is eight-fold between the white subset of the population and the minority/economically disadvantaged populations.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Annually, the proposed magnet schools will be evaluated to determine if the demographics parallel the District. Should any variation in demographics occur, the District can

adjust its marketing and [REDACTED] to accommodate the needed enrollment. It is important to note that assigning priorities based on racial demographics would result in a plan that would provide applicants from underrepresented groups a better chance of being selected. Such a plan, however, was found to be unconstitutional in *Tuttle v. Arlington County School Board*, 195 F.3d 698 (4th Cir. 1999). As such, the District’s proposed plan does *not* target students based on racial demographic profiles. [REDACTED]

#### **D. Creating an Effective Plan: The Marketing Plan**

School Choice & Parental Options, the office that oversees magnet programs, has a centrally-organized marketing plan designed to inform a diverse community about magnet school offerings through in-house produced marketing and recruitment materials. In addition to

producing recruitment materials, this department organizes targeted district-wide recruitment activities. These strategies include the following:

*Community Recruiting Events & Presentations*

- The Children’s Trust/M-DCPS Back-to-School EXPO -- a free event held every September that attracts more than 20,000 parents and children annually. The event, in which M-DCPS plays an integral role, showcases M-DCPS Magnet programs.
- Town Hall Meetings -- events hosted by school board members and the Superintendent in varying locations throughout the district each school year and attended by parents, students, community partners, and other interested persons. Magnet schools are invited and make program presentations.
- Parent Academy-- events held at school sites. Parent Academy, a free year-round parent engagement initiative of M-DCPS designed to assist parents in becoming full partners in their children’s education, also promotes magnet school programs.
- Video and Radio Broadcast Events -- 30-second commercials for magnet schools produced by SCPO air on English, Spanish, and Haitian Creole media outlets throughout the recruitment period, and appear in movie theaters prior to feature films.
- School Site Magnet Open Houses -- Conduct Magnet Open House events for parents and students held at each school site to showcase offerings, offer hands-on activities for parents and students, and answer questions regarding the program and the application process.

- Targeted Recruitment Activities -- recruitment events held in low socioeconomic priority neighborhoods identified through research and through utilization of the Guide K-12 system. Activities include those held at conferences, fairs, and workshops such as the Code Fever workshops held on Saturdays for students from underserved low income communities, and workshops and classes offered by Black Girls code, an initiative that brings affordable and accessible technology to girls of color ages 7-17.
- 8th Grade Magnet School Recruitment Events -- recruitment presentations made by Magnet high school lead teachers at all district middle schools.
- Elementary Recruitment Events -- visitations made by elementary magnet lead teachers, 5th grade magnet student ambassadors, and school choice personnel to pre-K programs, community child care centers, churches and daycares to educate parents, students and community partners to inform the public and parents about elementary school magnet offerings.
- Enrollment Centers -- staffed application centers strategically located in neighborhoods that serve underrepresented groups are available to assist students and parents in the application process.
- Resource Centers -- recruitment materials and information on magnet schools actively distributed at a staffed Title I Center located at 7900 N.W. 27th St, an area where residents tend to be economically disadvantaged and at local libraries and churches.

*Marketing and Recruitment Materials*

The following materials are created in-house at School Choice & Parental Options and are designed to target a racially and socioeconomically diverse student body:

- Print materials (brochures, flyers, postcards, banners) produced and distributed to priority neighborhoods in the three major languages spoken in Miami-Dade County: English, Spanish and Haitian Creole.
- Strategically placed bus wraps, bus benches, kiosks, and Metromover station domination, a marketing takeover of a public transportation station.
- Social Media blasts on Twitter, Facebook, and Instagram.
- School-site video overviews of magnet programs
- Web presence
- All marketing and recruitment material lead back to the District Magnet Schools website to facilitate communication with interested and targeted groups.

**DESEGREGATION**

*2) How it will foster interaction among students of different social, economic, ethnic, and racial backgrounds in classroom activities, extracurricular activities, or other activities in magnet schools in which the magnet school programs operate.*

In order to *foster interaction among students* of different social, economic, ethnic, and racial backgrounds, it will be imperative to first develop a culture of teamwork towards a common goal. Salas et al. (1992) characterizes teams in *Teams: Their Training and Performance* as “a distinguishable set of two or more people who interact dynamically, interdependently, and

adaptively towards a common and valued goal/objective/mission.” The proposed desegregation plan utilizes problem/project-based learning, that relies heavily on teamwork as a primary instructional strategy, *to foster interaction in classroom activities* at all three schools, and emphasizes that not only will all students engage in team learning, but that all staff also be encouraged to work as a unified team. The plan also includes dedicated professional development on diversity to reduce implicit bias in lesson planning, further fostering effective teamwork.

Research on the concept of teamwork suggests that effective teams develop a “shared mental model” to coordinate behaviors by anticipating and predicting each other’s needs and adapting to demands of the team (Fiore et al., 2003). For teams to successfully coordinate their actions, they must possess commonly held knowledge structures that allow them to predict team behavior based upon shared performance expectations (Cannon-Bowers et al., 1993). In its simplest form, this includes knowledge of the team’s objectives and goals but also includes knowledge of the teammate roles and responsibilities along with the team tasks and procedures and timing/sequence of the tasks at hand. It is important to note that implementing such a model remains neutral of all social, economic, ethnic, and racial factors. The model proposes that students and teachers working to a common goal with a shared bank of knowledge will function collaboratively if the goal/vision/mission is shared and roles to achieve the goal/vision/mission are clearly delineated. Incorporating teamwork into the problem/project-based model for instructional strategy, fosters interaction among students who must learn to work effectively in

dynamic groupings with different perspectives on shared knowledge to solve a problem or provide a solution. Teamwork models have shown that when teams are comprised of diverse members, their different perspectives often result in better work (Florida, 2011). This research has even been applied on a macro-level in showing that diverse cities experience more economic growth than those that are segregated/isolated demographically. The same research has also demonstrated that corporations that employ teaming strategies with females on their boards financially outperform those that do not.

As a pathway to future success in a post-secondary or professional industry setting, students engaged in the *STEM Pathways Project* will be prepared for effective teaming through the incorporation of project-based learning strategies which clearly define the roles of teams. All students who apply to the proposed schools/programs are applying primarily because of their interest in the theme/curriculum. As such, all students will develop shared knowledge about the theme while enrolled in the program, the first step to establishing a culture of effective teaming. Randomly-selected diverse teams of students will be established in all of the schools in the *STEM Pathways Project* in order to engage in the development of student-developed products and solutions to problems specific to their magnet theme.

Aside from collaborative teamwork within the magnet program courses, students in content area courses will be heterogeneously grouped to include students from differing magnet programs and non-magnet students at the high schools. This scheduling design will further

encourage inclusionary practices in working across disciplines, as well as sharing differing experiences and perspectives to achieve common goals.

On a personal level, it is important to engage students through daily practices that further knowledge acquisition. Such acquisition often extends beyond the school day. In an effort to ensure that the proposed desegregation plan remains effective, students will engage in *extracurricular activities* and field site visits. During such events, team-building activities will be implemented to further the interaction among students outside of their academic teams. The diversity of these extracurricular teams will, again, provide students with avenues to explore how different perspectives on a problem or task can impact their results. Likewise, access to field site visits, local/regional businesses, and post-secondary schools selected based on their diversity and relationship to their magnet theme, will expose students to the diversity that currently exists in their interested field of study.

*Fostering Interactions: Compositional Design*

The *STEM Pathways Project* identifies three different schools of varying compositional designs. The tables below outline the various implementation phases with plans to foster interaction between students in the magnet programs and students that are currently enrolled in the school prior to the inception of the magnet programs.

<b>Barbara Goleman High School</b>	
<b>Phase 1 Years 2-4 of the <i>STEM Pathways Project</i></b>	<b>Phase 2 Year 5 of the <i>STEM Pathways Project</i> and Beyond</b>
<p><i>The school will be comprised of both magnet and existing non-magnet students. The school will utilize proactive strategies to foster interactions between the magnet and non-magnet students.</i></p> <ul style="list-style-type: none"> <li>● All core and non-magnet elective courses will be comprised of both magnet and non-magnet students.</li> <li>● All core and non-magnet elective courses will utilize cooperative learning strategies including the use of problem/project-based learning. Teachers will ensure that project teams are comprised of both magnet and non-magnet students.</li> <li>● All students will be eligible and encouraged to attend tutoring sessions regardless of their magnet status. Students in the lowest 35 percent in each of the core subject areas will be targeted for tutoring regardless of their magnet status.</li> <li>● In order to increase interactions between magnet and non-magnet students and between students from different social, economic, ethnic, and racial backgrounds, school-wide extracurricular activities will be open to all magnet and non-magnet students.</li> </ul>	<p><i>The school will be comprised entirely of magnet students. The school will utilize proactive strategies to foster interactions among the seven different magnet programs.</i></p> <ul style="list-style-type: none"> <li>● To promote an inclusive learning environment and foster interaction among all students, all core and non-magnet elective courses will be comprised of students from varying magnet programs.</li> <li>● All courses will utilize cooperative learning strategies including the use of problem/project-based learning.</li> <li>● All students will be eligible and encouraged to attend tutoring sessions. Students in the lowest 35 percent in each of the core subject areas will be targeted for tutoring.</li> <li>● In order to increase interactions between students from different social, economic, ethnic, and racial backgrounds, and to promote unity among the seven magnet programs, school-wide extracurricular activities will be open to all magnet and non-magnet students.</li> </ul>

**Southridge Senior High School**

**Years 2-5 of the *STEM Pathways Project* and Beyond**

*The school will be comprised of both magnet and existing non-magnet students. The school will utilize proactive strategies to foster interactions between the magnet and non-magnet students.*

- All core and non-magnet elective courses will be comprised of both magnet and non-magnet students.
- All core and non-magnet elective courses will utilize cooperative learning strategies including the use of problem/project-based learning. Teachers will ensure that project teams are comprised of both magnet and non-magnet students.
- All students will be eligible and encouraged to attend tutoring sessions regardless of their magnet status. Students in the lowest 35 percent in each of the core subject areas will be targeted for tutoring regardless of their magnet status.
- In order to increase interactions between magnet and non-magnet students and between students from different social, economic, ethnic, and racial backgrounds, school-wide extracurricular activities will be open to all magnet and non-magnet students.

**Pinelake Elementary School**

**Years 2-5 of the *STEM Pathways Project* and Beyond**

*The school will be converted into a magnet-themed school. The school will utilize proactive strategies to foster interactions between the boundary and non-boundary magnet students.*

- All grade-level classes will be comprised of students with varying social, economic, ethnic, and racial backgrounds.
- All grade-level classes will utilize cooperative learning strategies including the use of problem/project-based learning while incorporating the school-wide magnet theme.
- All students will be eligible and encouraged to attend tutoring sessions. Students in the lowest 35 percent in each of the core subject areas will be targeted for tutoring.
- In order to increase interactions between all students regardless of social, economic, ethnic, and racial backgrounds, the school will encourage student with parent participation in school-wide extracurricular activities.

## **DESEGREGATION**

*3) How it will ensure equal access and treatment for eligible project participants who have been traditionally underrepresented in courses or activities offered as part of the magnet school, e.g. women and girls in mathematics, science, or technology courses, and disabled students.*

As a District, The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in educational program/activities and services, and strives affirmatively to provide equal opportunity for all students as required by the Florida Education Equity Act, which prohibits discrimination against a student on the basis of race, gender, national origin, marital status, or handicap. In addition, M-DCPS adheres to the policies and procedures that assure equal access in educational program and activities. The School Board Policies 1362, 3362, 4362, and 5517 prohibit harassment and/or discrimination against students, employees, or applicants on the basis of sex, race, color, ethnic or national origin, religion, marital status, disability, genetic information, age, political beliefs, sexual orientation, gender, gender identification, social and family background, linguistic preference, pregnancy, and any other legally prohibited basis.

In 2015, Miami-Dade County Public Schools released its research-based strategic blueprint for 2015-2020, Vision 20/20. This plan includes a commitment to providing equitable access to quality instructional programs for all students. The *STEM Pathways Project* will ensure equal access and treatment for eligible project participants who have been traditionally underrepresented in STEM.

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Selection and participation in *STEM Pathways Project* programs/schools will be based solely on student interest. Academic examination will not be used to screen or select students. As part of the services already provided by the District, students will receive adequate remediation and acceleration support to succeed through differentiated instruction, cooperative learning, Response to Intervention (RtI), individualized instruction, and tutoring. Additionally, in order to increase accessibility and equitable treatment to ensure success for students with disabilities and English language learners, supplemental and related services will be provided according to each student's Individual Educational Plan (IEP) or Limited English Proficiency plan and integrated into the student's learning activities. Peer supports will be utilized and special and general education teachers will collaborate to ensure the implementation of the appropriate accommodations in all instructional activities. Students experiencing difficulty will be provided interventions including tutoring, differentiated instruction, cooperative structures, and assistive technology.

MSAP funds are also requested to subsidize the addition of two class periods at the *STEM Pathways Project* schools. For secondary schools that offer a traditional six-period class schedule, the added periods will ensure students have the opportunity to take elective courses, which are often those within the magnet theme. Additionally, this action will serve to promote equitable treatment and to eliminate a barrier to access for students who have not attained a minimum level of proficiency in reading and/or mathematics on state assessment exams, and who are currently required to be "double-dosed" in the class(es) in which they lack proficiency.

The additional class periods will allow these students the opportunity to participate in the magnet-themed coursework as well as their remedial class(es).

*Women and Ethnic Minorities in STEM*

The underrepresentation of women and ethnic minorities in STEM education, for a myriad of reasons, is well documented (e.g., Ceci and Williams 2007, 2010, 2011; Brown and Leaper 2010; Dweck 2007; Eccles 2007). *STEM Pathways Project* schools will ameliorate this issue by implementing the following strategies identified as being effective for targeting females and ethnic minorities (Valla and Williams 2012):

- engage gender and ethnically diverse university, business and industry professionals who monitor, mentor, and guide students, as a group as well as individually, over an extended period of time;
- provide access to the most challenging courses (e.g., Advanced Placement and Dual Enrollment) and supplemental services (e.g., counseling and tutoring);
- encourage long-term investment of students participating in a magnet program that offers a four-year, sequential course of study that is STEM-focused and provides a pathway to college and career;
- provide peer-to-peer interactions in which students offer each other academic and social/emotional support through team projects;
- emphasize career mentorship and career counseling;
- provide hands-on experience and/or interactions with STEM role models;

- provide opportunities to involve parents in STEM magnet-related activities (e.g., events where students demonstrate and present projects created in their magnet classes); and
- provide targeted recruitment activities such as those detailed in the marketing plan.

## **DESEGREGATION**

*4) The effectiveness of all other desegregation strategies as proposed by the applicant for the elimination, reduction, or prevention of minority group isolation in elementary schools and secondary schools with substantial proportions of minority students.*

In addition to the desegregation strategies that are identified in the detailed recruitment plan in section one (1) of Desegregation and are designed to provide information pertaining to the unique and rigorous magnet programs to all socioeconomic and racial groups in the District, M-DCPS also provides academic support and employs strategies for retaining underrepresented students while engaging the public in a variety of ways, recognizing the importance of community voices in achieving diversity outcomes. The *STEM Pathways Project* will implement the additional strategies outlined below to eliminate, reduce, or prevent minority group isolations in all of the proposed elementary and secondary schools identified as having substantial proportions of minority students.

### *Professional Development on Diversity*

In an environment rich in diversity as a product of desegregation, it is important to work strategically to ensure equitable treatment for project participants. Professional development on diversity for project staff, school-site administrators, Lead Teachers, and classroom teachers through workshops, extended small learning groups, job-embedded professional development,

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and Summer Institutes, will be an essential component of the *STEM Pathways Project* and use of MSAP grant funds. This focus of professional development will empower administrators and teachers with the tools to establish a culturally competent school-wide environment; recognize implicit bias and adjust instructional strategies; and provide high-quality instruction to a diverse group of students resulting in retention of underrepresented groups and increased student achievement.

### *Instructional Summer Pathway Program*

In an effort to alleviate the challenges associated with the transition to high school, both *STEM Pathways Project* high schools will develop and implement a Summer Pathway Program for incoming 9th grade students implemented with grant funds, but sustained by generated FTE. The Summer Pathway Program will be designed to provide students with strategies for success in the rigorous and challenging programs that will be provided at *STEM Pathways Project* high schools. MSAP grant funds will be utilized to implement a two-week program at each school site. These programs will align to content and skills of the unique 9th grade magnet curriculum, including Algebraic Thinking, Project-based Learning, Foundations of Research, Time Management & Organizational Skills, Lab & Field Safety, Equipment, and Measurement & Uncertainty. These programs will foster interaction and build relationships among rising 9th grade students; develop connections between students and teachers; and provide students with authentic, experiential, and interdisciplinary learning opportunities that require students to work collaboratively in teams to research, analyze, and uncover solutions to real world problems at the

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schools and community venues. The Summer Pathway Program also attempts to bridge the academic and socioeconomic gaps that exist between students by developing an individualized plan designed to provide new students with a foundation for the path to success, despite originating from different schools, family structures, races, ethnicities, and having varying resources and cultural differences.

### ***Retention of Students: The FastPATH Lab***

The *STEM Pathways Project's FastPATH Lab* concept integrates a practice that is commonly employed in university settings whereby students are afforded the opportunity to engage in supplemental educational and social activities with mentors. According to O'Keefe (2013) "[the] creation of a caring, supporting, and welcoming environment is critical in creating a sense of belonging [among students]. This can be achieved by the development of positive student/faculty relationships, the presence of a well-resourced counseling center, and the encouragement of diversity and difference." Therefore, the proposed project will develop one *FastPATH Lab* in each of the three proposed schools that will be staffed by Success Mentors comprised of school staff and community volunteers. The District will enlist the input and support of various community committees and agencies including citizen advisory committees, family and community agencies, and business and community leaders in designing and delivering the *FastPATH Lab* activities focused on encouraging student success and interactions among diverse groups of students. Each school will be charged with developing a task force with representation from the aforementioned stakeholders and the assistance of the District to

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establish customized curricular, extracurricular, and social-development activities for the school. *FastPATH Labs* will be staffed until 6:00 PM daily from Monday through Friday. Walton & Cohen (2011) concluded that uncertainty about belonging can undermine minorities' academic performance and social belonging and may constitute a psychological lever where the targeted intervention could yield broad results. Therefore, the Success Mentors will ensure that students develop a sense of belonging, and that they can be successful by embedding safeguards to include providing both academic and social support while engaging students in team-building activities that will build comradery and develop a positive and supportive culture. In addition to providing students with a safe-space on campus and access to resources that may not be available at home (ie. computers, printers, wi-fi, scanners, tutors), the *FastPATH Lab* will also offer supplemental activities that will appear on a monthly calendar distributed to students and parents to ensure that students and parents are aware of educationally purposeful activities both in and out of the classroom.

### ***Family & Community Strategies: Parent Pathway Program***

The *STEM Pathways Project's* Parent Pathway Program aims at increasing connections among families of different social, economic, racial, and ethnic backgrounds at the respective magnet program/school. Parents play a very important role in supporting academic learning at home and at school. Such a role is critical in the successful development of a school's culture, a key component to the development of a sense of community at the school. In order to implement the aforementioned team model effectively, parent involvement and parental support will be

addressed. Often, a student's ability to work in a team is hindered by a parent's lack of understanding of the team's common goal. Parents must feel comfortable in entrusting their child to the care/supervision of other parents, regardless of differences in social, economic, racial or ethnic backgrounds, as students work together to achieve a common goal. In order to prevent minority group isolation at both the elementary and secondary school level, have the opportunity to take an active role in ensuring that students remain culturally sensitive to each other.

Therefore, parents must be culturally sensitive to each other and develop cultural competencies.

The *STEM Pathways Project* school leadership will develop activities, outlined below, to engage parents in culturally responsive activities at all three schools by involving them in the Parent Pathways Program, which incorporates the following strategies to learn to recognize and respect differences:

- Family Service and Engagement Projects - parents will work in collaboration with other families, students, and school staff members to plan/participate in community projects to solve issues/problems. Each school will establish and execute at least one community project per semester. The nature of the hands-on project will be at the discretion of each school, however, each school will ensure that solicitations to participate in the projects are provided to all parents and school partners. Parent and student participation will be encouraged by providing incentives to those that participate.
- School Enhancement Projects - parents will work in collaboration with other families, students, and school staff members to plan/participate in schoolwide

restoration/enhancement projects to improve the aesthetics of their child's school. Parent and student participation will be encouraged by providing incentives to those that participate.

- Family Seminar Series - families will partake in evening/weekend workshops, which have been presented effectively in the past throughout M-DCPS by the Parent Academy, addressing topics such as:
  - a. The Florida Standards and Florida Standards Assessments
  - b. College and Career Planning
  - c. Scholarship Sourcing
  - d. Effective Parent and Teacher Communication
  - e. H<sup>3</sup> (*How to Help at Home* by utilizing math/reading/science/social studies resources)
- Tech Teams - families will partake in weekend/evening technology training workshops to build their capacity in utilizing district resources and applications as they relate to the academic progress of their child. Families will work in training teams that parallel student project teams in order to develop inter-family relationships.

Implementing these strategies will encourage parents to share information and resources, and to provide each other with the support necessary to ensure a successful education for all students in the proposed programs/schools.

*iCode Summer Camps*

Annually, seventh and eighth grade students from targeted priority neighborhoods will be provided the opportunity to engage in a hands-on, high-tech, project-based two-week coding camp experience that will serve to recruit interested students to apply to the magnet, provide a valuable academic experience, and prepare them to transition to specific magnet program strands. In week one, students will use basic coding concepts to create apps, games, or animations. In week two, students will be engaged in introductory hardware coding while developing individualized projects using an open source electronics platform. The camps will enable students to engage with magnet content teachers in an informal educational setting, thus enabling students to develop a rapport with the magnet teachers. Such an experience aids in the marketing of the project schools and provides potential students and parents with a preview of the instructional resources, strategies, methods, and approaches. All students will be able to showcase their creations to an audience of their tech peers, faculty, and parents in a culminating symposium at the conclusion of which parents will be able to speak to project staff about the magnet application process and the opportunities available to their child at the host school.

*FLEX-Stop Hub Transportation Services*

While the District fully recognizes the value that magnet schools provide to a student's education, it is often the case in Miami-Dade County that the most limiting factor for many parents choosing to enroll their child in a magnet school is the cost associated with transporting their child to the magnet school. All three of the proposed magnet schools will service the entire

Miami-Dade County Public Schools district, and, in the case of Barbara Goleman Senior High School, students [REDACTED] will also benefit from being able to apply to the magnet programs. In order to ensure that the transportation barrier is addressed, the *STEM Pathways Program* will implement a FLEX-Stop Hub transit system throughout [REDACTED] [REDACTED] to ease the financial burden on parents to transport their children, thus increasing the probability of a successful registrant to the magnet program.

The concept of the FLEX-Stop Hub involves establishing pre-defined, centralized stops at local public schools and county parks proximal to the largest concentration of students that are identified for services within a boundary area in the priority neighborhood. By establishing multiple FLEX-Stop Hubs, parents will have the flexibility of traveling much shorter distances to drop-off and pick-up their children. The FLEX-Stop Hub transit service will be provided to parents and students at no cost to the parent. The District will re-evaluate the FLEX-Stop Hub locations annually [REDACTED] are evaluated in order to determine if an increase in the number of stops is required. The District's Department of Transportation (DOT) utilizes a cloud-based, geographic information system to calculate routes, timings, and stops. The *STEM Pathways Project* team will work closely with the DOT to ensure that Hub stops are geographically placed to meet the needs of servicing priority neighborhoods, thus, ultimately increasing the likelihood of reducing socioeconomic and minority group isolation at the proposed magnet schools.

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The *STEM Pathways Project* budget will include grant funds to cover three busses and drivers to deliver FLEX-Stop Hub transit services for the proposed magnet schools. In addition to providing transit services, all three busses will be equipped with GPS trackers to provide parents with live geo-location and geo-fencing services via the M-DCPS Mobile App, thus providing parents with a mechanism by which to track the mobility of their child and provide parents with exact departure and arrival times. Likewise, the FLEX-Stop Hub busses will also be equipped with on-board Wi-Fi to provide students with a mechanism by which to remain connected, thus providing them with the ability to work on assignments on-the-go. To sustain the project, M-DCPS commits to absorbing the cost of the FLEX-Stop Hub transit system after MSAP funding expires.

**QUALITY OF PROJECT DESIGN***Magnet Program Descriptions*

Miami-Dade County Public School's *STEM Pathways Project* proposes to open two multi-thematic magnet high school programs and one thematic magnet elementary school program. These programs are designed to promote equity and access to all students throughout the Miami-Dade County Public School (M-DCPS) district and to interest and attract diverse groups of students. The collaborative teaming design coupled with the unique focus of the proposed magnet programs is expected to foster an increase in academic achievement while reducing, preventing, or eliminating minority isolation at the three campuses. Below is a description of each school's programs summarizing the themes, project partners, and content focus area:

**Pine Lake Elementary School**

The *STEM Pathways Project* will open a new STEM district-wide magnet program, designed to increase rigor and promote higher academic achievement by creating a singular, school-wide academy within an existing facility that houses Pine Lake Elementary School located in the southwest quadrant of Miami-Dade County. The demographics of the school/surrounding neighborhood are presented in **Table 1** below.

**Table 1: Pine Lake Elementary Demographics and Neighborhood Profile**

W	B	H	A	I	AI	M	Female	Male	FRL	Total
2.5	58	38	0	0	0	0	43.2	56.8	95.4	478

*W:White, B:Black, H:Hispanic, A:Asian, I:Islander, AI:American-Indian, M:Multi-racial, FRL:Free-Reduced Lunch*

The school’s existing population of students (n=478) accounts for a 75 percent occupancy rate and will be augmented by the inclusion of the students recruited into the new magnet program. All students, regardless of whether recruited via the magnet process or automatically articulated as a result of living within the school’s boundary, will receive the magnet curriculum. The school’s proposed magnet program is described below:

<b><i>Botany &amp; Zoology</i></b>
<p>The Botany &amp; Zoology Magnet at Pine Lake Elementary is designed to engage students in problem solving and the exploration of environmental issues while encouraging them to take action using a problem/project-based approach to improve the environment. Students will take part in environmental outreach and education efforts at the following three partner sites: students will be immersed in hands-on learning at Fairchild Tropical Botanic Garden; engaged in authentic, ranger-led habitat explorations as they venture through Florida’s river of grass in Everglades National Park; and captivated by Zoo Miami’s efforts to conserve critically threatened and endangered animals from around the world. In close proximity to all three partner sites, as well as Richmond Heights’ Zoo Magnet Middle School program and</p>

BioTECH @ Richmond Heights 9-12, the nation's only Conservation Biology magnet high school, Pine Lake's Botany & Zoology Magnet will facilitate the development of a seamless K-12 continuum in which students can continuously broaden their interest in science, technology, and mathematics and become effective environmental stewards and future researchers.

The proposed magnet program at Pine Lake Elementary School will support the expected 7 percent growth in the field of Conservation Science as described by the United States Bureau of Labor Statistics (2015) within the subsequent three years. The Botany & Zoology Magnet program will partner with: 1) Florida International University's (FIU) College of Arts, Sciences, & Education, FIU's largest and most diverse college at the University with over 1,100 faculty members and home to two centers focused on tropical conservation: the International Center for Tropical Botany and the Tropical Conservation Institute; 2) Zoo Miami, the largest zoological park in Florida and the only tropical zoological park in the country; 3) Fairchild Tropical Botanic Garden, an 83-acre subtropical botanical garden that provides an avenue for the conservation of plants; and 4) Everglades National Park, the third largest national park in the continental United States with a major emphasis on conservation and restoration. These partners will be instrumental in assisting M-DCPS staff to structure, design, and deliver the program curricula for the Botany & Zoology program. Pine Lake Elementary School teachers will learn in collaboration with scientists and researchers during highly structured professional development workshops for M-DCPS teachers. It is anticipated that students from Pine Lake Elementary's

Botany & Zoology magnet program will articulate into the District’s existing Zoo Magnet Program at Richmond Heights Middle School and eventually transition to BioTECH @ Richmond Heights 9-12, an MSAP-funded school that has received national accolades as a model of success and the only Conservation Biology magnet high school in the nation.

Staff/Scientists from all partner sites will be invited along with parents and community groups to sit on the school-site Magnet Advisory Board as subject area experts who can continually assist to ensure that the post-secondary pathway remains aligned and current.

**Barbara Goleman Senior High School**

The *STEM Pathways Project* will open three new STEM district-wide magnet programs designed to increase rigor and promote higher academic achievement. Two of the three magnet programs will each embed 3 unique career strands, as described below. The three magnet programs will be located at a facility that currently houses Barbara Goleman Senior High School, located in the northwestern quadrant of Miami-Dade County. The demographics of the school/surrounding neighborhood are presented in **Table 2** below.

**Table 2: Barbara Goleman Senior High School Demographics and Neighborhood Profile**

W	B	H	A	I	AI	M	Female	Male	FRL	Total
5.1	8.8	84.4	1.2	0	0	0	50.4	49.6	67.3	1,797

*W: White, B: Black, H: Hispanic, A: Asian, I: Islander, AI: American-Indian, M: Multi-racial, FRL: Free-Reduced Lunch*

The school’s existing population of students (n=1,797) accounts for a 61 percent occupancy rate. As the existing cohorts of students graduate, the project will sequentially recruit

students into the three new STEM district-wide magnet programs, eventually giving rise to a fully-integrated STEM district-wide magnet school. The school's programs include:

### *Innovative Enterprise Technologies*

The Innovative Enterprise Technologies (IET) Magnet will prepare students for careers in a modern, technology-enhanced business field of study with a focus on information technologies, digital marketing, and financial technologies. The Innovative Enterprise Technologies Magnet is designed to integrate scientific research and technology using state-of-the-art computer software and tools to analyze and propose solutions for handling data for local and international businesses. The IET Magnet will contain three magnet strands:

- **Information Systems Technology** - students will develop skills and knowledge essential to effectively support the design, planning, and management of information infrastructures and information resources within diverse organizational settings in all aspects of our increasingly digital culture and economy. The curriculum will introduce concepts upon which information systems are founded and analyze them as suitable solutions to real-world enterprise problems.
- **Digital Marketing** - students will develop technical skills in career-specific areas such as HTML5 / CSS3, web development, server applications, scripting, responsive design, usability, SEO, XML, analytics, and social media. The curriculum will be approached using applied theory and hands-on learning to explain digital marketing strategies, tactics, and tools, including the creation of original content that employs marketing research to achieve digital distribution; the development of web applications utilizing

industry standard markup, protocols, and languages; the evaluation of marketing efficacy through analytics; and the design and implementation of information/navigation plans using the principles of information architecture.

- **Financial Technologies (FinTech)** - provides students the opportunity to apply mathematical, statistical, and programming tools to the financial and risk management disciplines. Designed to meet the growing need for quantitative modeling and analysis in finance and risk management, the program is technical and interdisciplinary in nature. Students will be provided with a solid foundation in financial mathematics, statistics, modeling, and technologies to prepare students for specialized technology-rich careers in the financial services industry. Students will then take a problem/project-based approach to applying mathematics to business processes and software as they work through assignments using the SAP/ERP logistics, human resources, supply and distribution, materials management, fiscal controlling, and other modules to gain practical experience with many business functions.

Graduates from the Barbara Goleman Senior High School Innovative Enterprise Technologies

### *National Security Intelligence*

The National Security Intelligence Magnet will introduce students to foundational knowledge and skills in forensics, intelligence & law enforcement, and cybersecurity. Work-based learning will be infused throughout the four years of the program starting with career awareness and exploration, and culminating with an internship during the summer after junior year. These experiential activities will take place at business partner locations of members serving on the program's National Academy Foundation (NAF) STEM Advisory Board. The National Security Intelligence Magnet will contain three magnet strands:

- **Forensic Science** - will prepare students for careers as forensic identification specialists. The program will equip students with the skills to be a key part of the criminal justice system, using scientific methods to interpret and analyze evidence, explore different types of crimes, understand what types of evidence are collected from crime scenes, and know how to interpret and collaborate information that is gathered from crime scenes. Students will learn techniques commonly employed in a criminalistics laboratory, study professional issues in forensic science, learn the principles of crime scene photography, and laws of criminal evidence. Students will work collaboratively with field experts in the development of their skills in bloodstain evidence handling, forensic microscopy, fingerprint evidence handling, IT forensics, and forensic anthropology. Authentic field and laboratory experiences are important components of the forensic science program.

- **Law Enforcement/Intelligence Studies** - will prepare students with the knowledge and skills necessary to excel in intelligence analysis, operations, military-political studies, law enforcement, corporate security, cyber-intelligence, and security. The program combines science and high-technology with advanced intelligence and criminal justice courses. Students receive advanced instruction in the research skills and analytical methods required by the security and intelligence fields along with the ability to communicate their findings clearly. The magnet strand will prepare students for careers as intelligence analysts, law enforcement and security professionals, and prospective analysts in the emerging field of intelligence analysis.
- **Cybersecurity** - students will learn to defend and protect networks and information systems against cyber attacks and participate in practical, interactive coursework that covers the analytical and technical skills necessary to prepare students to install critical software, monitor networks, detect intrusions, and respond to cyber attacks.

### *STEM Advanced Placement Capstone*

The STEM Advanced Placement (AP) Capstone Magnet is an original approach to the already innovative AP Capstone Diploma program whereby students will be able to declare a STEM major within the AP Capstone program. The AP Capstone program is built on the foundation of two courses:

- **AP Seminar** - students develop and strengthen analytic and inquiry skills, exploring two to four STEM-relevant issues chosen by the student and/or teacher. Students learn

to consider a STEM issue from multiple perspectives, evaluate the strength of an argument, and make logical, fact-based decisions. Students will question, research, explore, pose solutions, develop arguments, collaborate, and communicate using various media.

- **AP Research** - students design, plan, and conduct a year-long research-based investigation on a STEM topic of individual interest. Through this inquiry and investigation, students demonstrate the ability to apply scholarly understanding to real-world STEM-related problems and issues. Students further the skills developed in AP Seminar by understanding research methodology, employing ethical research practices, and accessing, analyzing, and synthesizing information to build, present, and defend an argument.

The program is designed to complement and enhance the in-depth, discipline-specific study provided through Advanced Placement courses. The program cultivates curious, independent, and collaborative scholars and prepares them to make logical, evidence-based decisions. In partnership with the College Board, the STEM AP Capstone Magnet will encourage students to consider and evaluate multiple points of view to develop their own perspectives on complex STEM-related issues and topics through inquiry and investigation, and provide students with a framework that allows them to develop, practice, and hone their critical and creative thinking skills as they make connections between various STEM-related issues and their own lives.

The proposed magnet programs at Barbara Goleman Senior High School will support the expected 17 percent growth in the field of Computer Science as described by the United States Bureau of Labor Statistics (2015) as well as the expected growth of 19 percent in the field of Information Security Analytics within the subsequent three years. The Innovative Enterprise Technologies and National Security Intelligence magnet programs will partner with the largest state college in the Florida College System, Miami Dade College (MDC); specifically, Miami Dade College's EnTech: School of Engineering and Technology. Likewise, the STEM AP Capstone Magnet will partner with the CollegeBoard, the nation's private non-profit College Entrance Examination Board to expand access to higher education. This partnership will foster relationships between Barbara Goleman's AP Capstone Magnet and the 284 colleges and universities that support the AP Capstone program, including acclaimed universities such as Princeton, Purdue, John Hopkins, Vanderbilt, Yale, and University of North Carolina at Chapel Hill. Specifically, both partners will be instrumental in assisting M-DCPS staff to structure and design the program curricula for the school. Additionally, subject area experts from MDC will be actively involved in providing professional development for M-DCPS subject area teachers. Likewise, EnTech Staff will be invited to sit on the school-site Magnet Advisory Board as subject area experts that can continually assist to ensure that the post-secondary pathway remains aligned and current.

### **Miami Southridge Senior High School**

The *STEM Pathways Project* will open three new STEM district-wide magnet programs designed to increase rigor and promote higher academic achievement by creating three new

career academies within an existing facility that houses Miami Southridge Senior High School located in the southwest quadrant of Miami-Dade County. The demographics of the school/surrounding neighborhood are presented in **Table 3** below.

**Table 3: Miami Southridge Senior High School Demographics and Neighborhood Profile**

W	B	H	A	I	AI	M	Female	Male	FRL	Total
3.8	39.8	54.9	0.6	0	0	1.5	45.8	54.2	83	1,962

*W: White, B: Black, H: Hispanic, A: Asian, I: Islander, AI: American-Indian, M: Multi-racial, FRL: Free-Reduced Lunch*

The school’s existing population of students (n=1,962) accounts for a 73 percent occupancy rate and will be augmented by the inclusion of the students recruited into the three new magnet programs. The school’s programs include:

<b><i>Business Innovation &amp; Management</i></b>
<p>The Business Innovation &amp; Management Magnet will prepare students for a modern, technology-enhanced business field of study. Students will learn how to plan and execute activities in coordination with one another in an authentic business setting. Students will take a problem/project-based approach to learning business processes and software as they work through assignments using the SAP logistics, human resources, supply and distribution, materials management, fiscal controlling, and other modules to gain practical experience with many business functions. Students will also engage in problem-based, interdisciplinary courses that detail Enterprise Resource Planning (ERP) concepts to help students develop competencies in the integrated software modules used to run virtually all business processes in</p>

modern organizations. Students will become part of a program that will provide coherent and rigorous content, aligned with challenging academic standards, and relevant technical knowledge and skills needed to prepare students for careers in the Informational Technology career cluster, including Enterprise Resource Planning.

### ***Design, Animation, & Gaming***

The Design, Animation, & Gaming Magnet will prepare students to study in the field of entertainment technology with an emphasis on game programming, animation, and virtual reality. The program exposes students to the breadth of game/animation development and design processes. Students will specialize in game design, production, engines, and systems. This curriculum is an intensive, problem/project-based program and will allow students to develop skills in modeling, lighting, motion, and sound. At the same time, students will gain command of the technical skills required in today's highly competitive animation industry. Students will work in teams to design, develop, and execute authentic and unique entertainment projects while operating within the business framework of such industry giants as Pixar Studios, Sony, and Walt Disney Animation. Student animators will work in teams to develop a movie, a visual effect, or an electronic game in state-of-the-art animation studios.

### ***Mobile Application Development***

The Mobile Application Development Magnet will prepare students to study the basics of iOS and Android mobile app programming languages such as Swift, C++, Objective-C, Java, and HTML5. Students will work in project teams to develop novel apps for businesses to

solve real-world problems in a problem/project-based environment in which students will be provided the skills necessary to establish a basic foundation in computer programming for employment in scientific, commercial, industrial, and government applications. Students graduating from Miami Southridge’s Mobile Applications Development Magnet will be prepared to excel in entry-level positions within the mobile application space. Students in the program will become computer programmers and be able to convert project specifications and problems into detailed logic from which code or instructions are generated. Student programmers will write computer programs to store, locate, calculate, and retrieve specific documents and data, and learn problem-solving skills as they are pertinent to the electronic workforce.

The proposed magnet programs at Miami Southridge Senior High School will support the expected 6 percent growth in the field of Computer Animation as described by the United States Bureau of Labor Statistics (2015) as well as the expected growth of 19 percent in the field of Software Development within the subsequent three years. The Design, Animation, & Gaming program and the Mobile Application Development program will also partner with Miami Dade College. Specifically, Miami Dade College’s EnTech: School of Engineering and Technology will be instrumental in assisting M-DCPS staff to structure and design the program curricula for the Mobile Application Development program while MDC’s MAGIC: Miami Animation & Gaming International Complex will be instrumental in the development of program curricula for the Design, Animation, and Gaming Magnet program. Additionally, subject area experts from

MDC will be actively involved in providing professional development for M-DCPS subject area teachers. It is anticipated that students from Miami Southridge’s Design, Animation, & Gaming and Mobile Application Development magnet programs will work in teams with undergraduate students from MDC on long-term animation, gaming design/programming, and mobile app development projects. MDC staff from both the EnTech and MAGIC programs will be invited to sit on the respective school-site Magnet Advisory Board as subject area experts that can continually assist to ensure that the post-secondary pathway remains aligned and current. The Business Innovation & Management Magnet at Miami Southridge will partner with SAP, one of the world’s leading ERP business software tool developers. ERP/SAP tools are employed by many leading companies, encompassing global organizations, governments, and educational institutions, including M-DCPS.

**QUALITY OF PROJECT DESIGN**

*1) The manner and extent to which the magnet school program will improve student academic achievement for all students attending the magnet school programs, including the manner and extent to which each magnet school program will increase student academic achievement in the instructional area or areas offered by the school, including any evidence, or if such evidence is not available, a rationale based on current research findings, to support such a description.*

Miami-Dade County Public Schools is recognized as a national leader in urban education. The District is a four-time finalist and the 2012 \$1 million winner of the prestigious Broad Prize, the largest education award in the country given each year to honor urban school districts that demonstrate the greatest overall performance and improvement in student achievement while

reducing achievement gaps among low-income and minority students. The District is committed to applying this same standard of academic excellence to the *STEM Pathways Project* schools.

The strategic blueprint for Miami-Dade County Public Schools, *Vision 20/20*, outlines a singular goal for all schools in M-DCPS: **Student Achievement**. The District's work will be focused on **Relevant, Rigorous, and Innovative Academics** with the highlighted objectives of ensuring that at least 90 percent of students will graduate with a standard high school diploma by 2020; the percentage of students attaining industry certifications in one or more areas of study will increase by at least 5 percent by 2020; the percentage of student concentrators in Career & Technical Education (CTE) Career Pathways will increase by 10 percent by 2020; the percentage of students exercising School Choice in under-represented zip codes will increase by 5 percent by 2020; and the percentage of economically disadvantaged students participating in accelerated coursework will increase by 5 percent by 2020. With these objectives in mind, the *STEM Pathways Project* proposes to implement an achievement model at all projectschools.

The instructional programs at all three schools feature innovative, educational methods and practices that address student needs and interests, and are designed to improve academic achievement for all students attending the schools. In 2013, M-DCPS opened BioTECH @ Richmond Heights 9-12, a STEM magnet school. As a result of its implementation strategies, which mirror the proposed strategies in the *STEM Pathways Project* grant, the inaugural cohort of students experienced an increase in academic achievement of 22 percent over the course of three years as evidenced by the increase in cumulative student grade point averages (GPA). Due

to the efficacy of the strategies implemented at BioTECH @ Richmond Heights 9-12, the *STEM Pathways Project* will mirror the same success by implementing the strategies below:

***Florida Continuous Improvement Model - STEM Pathways Project*** schools will utilize the Florida Continuous Improvement Model (FCIM), a capacity-building approach focused on providing data-driven instruction for all of Florida's students. Major elements of the FCIM process include:

- Utilization of evidence-based practices that build a school's capacity to establish continuous improvement as a way of work (assessing student needs using data; focusing instruction on the *Florida State Standards*; refining understanding of areas where students are struggling or succeeding; and customizing instruction for student achievement)
- Facilitation of focused instruction for all students
- Collaboration among teachers, students, and instructional support staff
- Active learning and student involvement in the learning process
- Ultimate responsibility for learning placed on the learner
- Data driven so as to remove subjectivity and replace it with a focus on results
- Alignment of planning, instruction, assessment, and support on student performance
- Utilization of assessment results to improve teaching and learning

FCIM will assist the *STEM Pathways Project* schools and teachers with the instructional planning process by helping them to: assess student needs using data; focus instruction on the *Florida Standards*; refine teacher understanding of the areas where students are struggling or

succeeding; and customize instruction for student achievement. Norm-referenced evaluations, such as Florida's Standards Assessments (FSA) in English/Language Arts (ELA) and Math, the FSA End-Of-Course (EOC) Assessments, and district topic exam measures provide disaggregated data feedback on academic growth. Monthly "data chats" will be held with the administration, among grade level/subject groupings, and with students in order to review and analyze the data and discuss intervention strategies needed to adjust teaching practices and subject area content accordingly.

***Problem/Project-based Learning (PbL)*** - Forty years of accumulated evidence confirm that the instructional strategies and procedures that make up standards-focused, problem/project-based learning are effective in promoting deep content understanding, raising academic achievement, and encouraging student motivation to learn. Research studies have demonstrated that problem/project-based learning can: increase students' achievement on state-administered, standardized tests (Geier, Marx, Krajcik, Fishman, Soloway & Clay-Chambers, 2008); be especially effective with lower-achieving students (Strobel, 2008); and can be more effective than traditional instruction in increasing academic achievement (Walker & Leary, 2008); knowledge application (Koh, Khoo, Wong, & Koh, 2008); teaching concepts and developing deep understanding of content (Boaler, 1997); preparing students for future learning (Schwartz, 2004); and preparing students to be better able to integrate and explain concepts (Capon & Kuhn, 2004). *STEM Pathways Project* schools will utilize experiential, interdisciplinary problem/project-based learning experiences as the framework upon which teaching and learning

of core concepts is built, and which provide opportunities for students to master academic content, learn workforce skills, and develop personal strengths.

***Summer Pathways Programs*** - In an effort to mitigate the challenges of ninth grade transition, and to prepare incoming students with strategies for success in the rigorous and challenging programs that will be provided at *STEM Pathways Project* schools, MSAP grant funds will be utilized to provide two-week Summer Bridge Programs, modelled after the successful program at BioTECH, at the two high schools beginning in Summer 2017. These programs will align summer bridge content and skills to the ninth grade curriculum; foster interaction and build relationships among students entering the schools; develop connections between students and teachers; provide students with authentic, experiential, and interdisciplinary learning opportunities that require them to work collaboratively in teams to research, analyze, and uncover solutions to real world problems at the schools and in community venues.

***FastPATH Labs*** - MSAP grant funds will also be used to fund the *FastPATH Lab* at each of the three schools in the proposed *STEM Pathways Project*. The *FastPATH Lab* is similar in practice to one commonly employed at university settings, and will afford students the opportunity to engage in after-school academic support and tutorial services, interact with Success Mentors, and access resources that may not be available at home, to secure academic and social success in the *STEM Pathways Project*. The *FastPATH Lab* is also designed to foster a caring, supporting, welcoming environment, which are critical to creating a sense of belonging amongst students; developing a positive relationship with teachers, peers, and mentors; and supporting diversity

and difference (O’Keefe). The *FastPATH Lab* is an essential component of the *STEM Pathways Project* encouraging program retention, and student success.

***Career and College Readiness & Awareness*** - While adoption of the Florida State Standards in English language arts and mathematics represents an important step in ensuring that all students leave high school ready for success in college and a career, simply increasing rigor will not yield more prepared graduates (Roderick 2006). High school students must also have the opportunities to apply their knowledge in real-world situations and develop complex and critical thinking skills needed in both college and the workplace. The 2006 report *The Silent Epidemic: Perspectives of High School Dropouts* shows that nearly half of high school dropouts said they left high school because classes were not engaging them. By involving high school students in more interesting, inquiry-led work that has relevance to their daily life, significant improvements will be made in graduation rates, achievement, and other important academic outcomes (Bempechat and Seltzer 2010). After three decades of evaluation, career academies, a type of school-within-a-school (*Miami Southridge Senior High School and Barbara Goleman Senior High School*), or a school that promotes career development activities such as career awareness and exploration (*Pine Lake Elementary School*), have been found to be effective in improving outcomes for students. They have become the most long-lasting and best-tested component of a school reform strategy that preparing students for both college and careers. To that end, Pine Lake Elementary, Miami Southridge Senior High School, and Barbara Goleman Senior High School will provide students with high caliber, student interest-driven STEM curricula designed to improve academic achievement and prepare

them for both college and a career. The academic programs at each of these schools are characterized by:

- School-wide implementation of interdisciplinary content, which provides students opportunities to explore topics within real-world contexts;
- School-wide implementation of experiential, multidisciplinary problem/project-based learning;
- Daily schedules structured for extended/flexible instructional time blocks to allow students more time for work-based learning;
- Connection to real-world contexts that build upon community, industry, and college/university partnerships. These partnerships provide students with a deeper understanding of how high school academics connect to postsecondary and workforce demands, and enable them to potentially gain postsecondary credits while in high school; and
- Interaction with business and industry experts and mentors who provide students with additional supports that contribute to college and career readiness and awareness such as communication skills, project management, and the ability to work in teams.

Barbara Goleman Senior High School and Miami Southridge Senior High School are currently experiencing growth towards mirroring the targeted district graduation rate of 90%. The table below identifies the target increase as delineated in M-DCPS' Vision 20/20 Strategic Blueprint, as well as the expected annual increase in graduation rates necessary to achieve the goal. The projects are based on current data and do not factor in the effects of adding the

proposed magnet students.

**Table 1 - Expected Annualized Increase in Graduation Rates**

School	2015 Graduation Rate	Increase Required	Expected Annual
Barbara Goleman	83.6%	6.4%	2.13%
Miami Southridge	84.1%	5.9%	1.96%

The *STEM Pathways Project* aims to increase annual graduation rates at each high school by incorporating rigorous and relevant career pathways through career technical education (CTE) into the magnet programs. Students will enroll in specialized magnet courses that address the magnet themes while reinforcing core academic concepts. This approach will aid in providing students with the relevance that is often lacking in a traditional, core academic course while ensuring that those students that might not be able to attend supplemental academic sessions (i.e. after-school tutoring, Saturday tutoring) during non-instructional hours receive reinforcement. Such a practice will not only increase student achievement, but will also aide in developing students to be college and career ready.

***State Standards & Data-Informed Decision-Making.*** The instructional programs at the schools will be aligned with challenging state content standards. *Florida’s State Standards* describe the knowledge or ability that a student should be able to demonstrate by the end of every grade level from kindergarten through 12<sup>th</sup> grade. These standards cover eight content areas: English Language Arts, Mathematics, Science, Social Studies, Physical Education, World Languages, Fine Arts, and Health Education. The standards are subdivided into strands and clusters which

outline the specific content, knowledge, and skills that students are expected to learn in school. For high school students, the Florida Standards Assessment (FSA) in Reading and Writing indicate each student's performance in reaching benchmarks for those subjects. In 2011-12, Florida transitioned from high school comprehensive tests to End-of-Course (EOC) Assessments which are computer-based, criterion-referenced assessments that measure the *Florida Standards* for specific courses. Currently, students take EOC Assessments in Algebra 1, Geometry, Algebra 2, Biology 1, and United States History. For kindergarten through second grades, students take the i-Ready Diagnostic exams, the SAT-10 reading/math exams, and English Learners (EL) students take the ACCESS exams. In grades three through five, students take the FSA ELA Reading/Writing exam, the FSA Math exam, the District ELA Writing text, Mid-Year Assessment tests in ELA & math, and fifth grade students take the Florida Comprehensive Assessment Test in Science. These exams generate a wealth of data that is utilized in the instructional planning process at all three *STEM Pathways Project* schools.

Data-driven decision making is central to how educators evaluate their practices and monitor academic achievement, and is critical in ensuring that all schools in Miami-Dade County work towards closing the achievement gap. M-DCPS' Office of Assessment, Research, and Data Analysis (ARDA) oversees all assessments, data collection, and data analysis to ensure the accuracy and validity of student achievement data that drive the decision making processes at all schools and at the district level. Data is provided to teachers and principals via a Data Dashboard application, through the District's ARDA data portal (<http://oada.dadeschools.net>), and through structured query language (SQL) database applications available through the

District’s intranet. Data will be disaggregated at each *STEM Pathways Project* school to analyze the extent to which the magnet school programs have improved student academic achievement for all students and to determine the percentage increase in student achievement as a result of the implementation of the *STEM Pathways Project’s* Achievement Model. Through gap analysis, *STEM Pathways Project* school leadership teams will take a systematic approach in identifying gaps in student learning and make decisions about the best use of instructional resources to provide school-wide support in meeting the singular goal identified in M-DCPS’ *Strategic Blueprint: Student Achievement*.

### QUALITY OF PROJECT DESIGN

2) *The extent to which the applicant demonstrates that it has the resources to operate the project beyond the length of the grant, including a multi-year financial and operating model and accompanying plan; the demonstrated commitment of any partners; evidence of broad support from stakeholders. (e.g. State educational agencies, teachers’ unions) critical to the project’s long-term success; OR more than one of these types of evidence.*

M-DCPS is financially committed to sustaining over 380 magnet programs. Since its first MSAP application in 1991, the District has successfully opened 22 different MSAP-funded magnet schools. It is important to note that these schools’ programs are financially sustained by the District and remain open and part of the District’s magnet offerings.

Miami-Dade County Public Schools is fully committed to the continuation of the initiatives proposed in the *STEM Pathways Project* after MSAP funding ends. In order to accomplish this, the District will leverage a broad range of current resources and aggressively pursue additional revenue after assistance under MSAP is no longer available. Currently, M-

DCPS commits its Supplemental Academic Instruction funds, generated through the Florida Educational Finance Program (FEFP) and enacted by the Florida Legislature to provide equitable distribution of state funds among school districts throughout the state, to operate the existing magnet school programs. These funds are in addition to M-DCPS initiatives (i.e. *Bringing Wireless Technology to the Classroom* drive in 2011-2012 that pulled in support of matching e-rate funding for wireless technology improvements in schools, the 21st Century Schools \$1.2 billion General Obligation [GO] Bond) that are already in place and are designed to sustain the infrastructure needed to expand technology access for all students, bridge the digital divide, and support anytime/anywhere learning. Furthermore, the District is committed to reducing minority group isolation in its schools and to supporting and sustaining magnet schools as a means to achieve that end. M-DCPS has demonstrated a history of commitment to providing and expanding public school choice options to meet the unique and diverse needs of its students for over forty years. In its Education Choice and Competitions Index, the Brookings Institute ranked the M-DCPS office of School Choice & Parental Options (SCPO) in the top ten in the nation for providing a significant number of quality options through its magnet programs and career academies (2012). Superintendent Alberto M. Carvalho publically committed to school choice, saying, “We are now working in an educational environment that is driven by choice....We need to be engaged in [the] choice movement” (2012).

The table below identifies the model by which all MSAP-funded magnet schools in M-DCPS have been financially sustained. MSAP funds have traditionally been allocated, and are being allocated in this proposal, towards the initial processes required to design and initiate a

new magnet program.

**Table 1 - M-DCPS Magnet School Financial Sustainability Model**

Funding Source	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-
MSAP	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	
FTE		FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
District Magnet Budget			FUNDED	FUNDED	FUNDED	FUNDED
Advanced Placement*		FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
IDEA**		FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
Supplemental		POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE	POSSIBLE

\* Advanced Placement funds are contingent upon student passing rates.

\*\*IDEA funds are allocated based on special education allocations.

\*\*\*Supplemental grants cannot be predicted as school site staff must independently apply for funds.

During the first five years of the proposed project plan, MSAP funds will be allocated towards the procurement of equipment and supplies that are necessary instructional resources to support the curriculum that would have placed a substantial financial burden on the District.

Traditionally, states provide support to school districts through legislative appropriations that do not include any additional categorical funds for magnet school programs. Florida, however, does allocate Supplemental Academic Instructional Funds. As stated earlier, the District allocates an annual budget to provide assistance for students enrolled in existing magnet school programs.

These resources provide assistance for students enrolled in the District’s magnet school programs with essential educational materials, supplies, equipment, personnel, and unique requirements necessary to implement thematic educational programs. However, high-end magnet STEM schools, such as those designed in the *STEM Pathways Project*, require large initial startup

funds. Costs associated with implementing the *STEM Pathways Project* exceed the per-student allocation generated through the state and are prohibitively expensive for the District. The MSAP grant is a cost-sharing vehicle whereby Miami-Dade County Public Schools has been able to create successful magnets under MSAP funding while allowing itself to sustain existing magnets. With the award of MSAP funds to support significant magnet school program start-up costs, *STEM Pathways Project* schools will be sufficiently prepared for institutionalization upon completion of the five-year funding cycle. The equipment and supplies being funded through MSAP funds are of substantial quality and are expected to exceed a lifespan of at least 10 years before requiring any substantial upgrading, at which point, the schools will be generating sufficient FTE to gradually provide upgrades.

MSAP funds are also being allocated towards school site personnel. M-DCPS commits to absorbing the cost of required MSAP school-site personnel after MSAP funds have been exhausted. As the schools' enrollments grow, so will FTE allocations at each school site. MSAP funding over the initial five years of the project will afford the programs the time necessary to increase in enrollment to become financially independent and self-sustaining. Likewise, the two high schools will, with the increase in rigor and Advanced Placement course offerings, receive Advanced Placement Academic Program funds (a supplemental source of revenue for schools in Florida based on academic success rates on the College Board's Advanced Placement exams) in response to the expected increase in student achievement on Advanced Placement exams as a result of the *STEM Pathways Project* implementation.

In addition to aggressively pursuing additional sources of funding, as needed, the District will leverage district resources to support costs associated with magnet school activities such as: magnet lead teacher salary supplements; magnet school marketing; industry certifications; dual enrollment costs; software licensing and subscriptions; e-text subscriptions; and wireless and infrastructure upgrades and maintenance. What will remain at the completion of the grant cycle will be three schools, successful at preventing minority isolation, and dedicated to providing STEM pathways to college and careers, featuring advanced and college-level coursework, AA degrees, and/or industry certifications. The three schools will feature a core of STEM content-expert, technology-savvy teachers capable of sustaining a rigorous and focused high-tech, problem/project-based curriculum in an environment that fosters student achievement and prepares students for college and careers in a STEM-related field.

There are several strong indicators of stakeholders' support and commitment to the STEM-themed magnet school projects being proposed. As part of the grant development efforts, the District worked closely with principals, members of school leadership teams, and university and community leaders who united in their efforts to plan for successful implementation of the proposed magnet school projects. More importantly, the existing STEM-focused schools are the most sought after by parents and students, with consistency, across all racial/ethnic groups in the District, as evidenced by the number of applications for the existing STEM elementary and high schools. Additionally, by identifying the needs in the community, by working with businesses, parents, community partners and organizations, and higher education institutions, and by bringing stakeholders to the table in designing and sustaining the program, the District has

created a climate that maximizes the probability of the project's success. Furthermore, a high level of support for the *STEM Pathways Project* is evidenced by both the variety and quality of the letters of support included in this application package as well as the offers of partnership and commitment to the undertaking as a whole.

Over the years, the Magnet Schools Assistance Program (MSAP) has provided critical resources that have allowed M-DCPS to establish innovative magnet school programs. As in the past with previous grants, M-DCPS will take full responsibility for maintaining all magnet schools established with MSAP grant funds. All magnet school programs established through MSAP funds over the past 22 years are still thriving today. Furthermore, these programs meet the state's annual measurable objectives, and graduation rate targets.

### **Commitment of Partnerships**

The District commits to sustaining the total costs of the project partners, including Miami Dade College, Florida International University, Zoo Miami, Fairchild Tropical Botanic Garden, Everglades National Park, Discovery Education and business and industry professionals who provided letters of support included in Attachments, have committed to mentorships, internships, and use of facilities; as well as assisting with identifying funding sources once Federal funds are no longer available. These partnerships are critical to the sustainability of the project.

#### ***Miami Dade College***

M-DCPS has a well-established relationship with Miami Dade College (MDC), the largest state college in the Florida College System. In partnership with MDC, M-DCPS has five different schools located on MDC campuses throughout the county. The oldest of which was

established in 1988. In addition, MDC facilitates over 4,000 dual enrollment registrations for M-DCPS students annually. The partnership with Miami Dade College's EnTec and MAGIC programs will not only strengthen the quality of the program offerings at each *STEM Pathways Project* school but also provide MDC with a pipeline of diverse and highly skilled students capable of achieving greater success in a post-secondary setting.

### ***Florida International University***

M-DCPS also has a longstanding relationship with Florida International University (FIU), the largest university in South Florida and the 2nd-largest in Florida. Currently, FIU's College of Arts, Science & Education is partnered with M-DCPS in mentoring teachers and partnering with M-DCPS schools on authentic pedagogical and scientific research projects while collaborating on grants. FIU also boasts over 6,000 dual enrollment registrations of M-DCPS students annually. The partnership with Florida International University's College of Arts, Science, & Education, the largest college at the University, will alter the way elementary science education is approached and will set Pine Lake Elementary on the path to becoming a model school for STEM education.

### ***Fairchild Tropical Botanic Garden***

Located in Miami, Fairchild is one of the world's preeminent botanic gardens with an outstanding collection of taxonomically-arranged and well-documented tropical plants. These collections are a resource of world significance and an important local resource offering a basis for education research and conservation. Fairchild has a long standing history of educational and

community outreach programming that promotes the understanding of tropical plants and the value of biodiversity.

In December 2012, Fairchild opened a new Science Village Complex, a state-of-the-art biological science and conservation research facility that currently houses students from BioTECH @ Richmond Heights 9-12. The facility boasts a classroom space that will also be utilized by Pine Lake students, with state-of-the-art technologies, a teaching laboratory space, a digital microscopy lab, a DNA laboratory, and a Tissue Culture laboratory where M-DCPS students, from both partnering schools are offered a more in-depth, authentic research experience.

Fairchild also demonstrates its dedication to the students of M-DCPS by facilitating the Fairchild Challenge, a program targeting some 125,000 M-DCPS students in more than 272 schools that promotes environmental awareness, scholarship, and stewardship in students in grades pre-K through 12, and by extension in their families, schools, and communities, through a combination of hands-on research, creativity, and a variety of competitive projects. Given the involvement that Fairchild currently has with the education sector and its vision to promote environmental awareness and change through botanical studies at all grade levels, coupled with the work that is on-going with BioTECH @ Richmond Heights 9-12, part of the K-12 Conservation Biology continuum at M-DCPS, Fairchild has affirmed its commitment to remain integrated in *STEM Pathways Project*.

***Zoo Miami***

Zoo Miami's commitment to worldwide conservation efforts serves as the cornerstone of its mission to encourage an appreciation for the world's wildlife and to help conserve it for future generations. From significant research and special studies being conducted in South Florida to field conservation efforts in some of the most remote and exotic places on Earth, Zoo Miami is recognized as a leader in the fight to preserve some of the world's most endangered animals and ecosystems. In collaboration with the Animal Sciences Team, Veterinary Team, Conservation & Research Team, and Nutrition Team, Zoo Miami will offer Pine Lake Elementary students an opportunity to learn about, and contribute to, both ex-situ (the process of protecting an endangered species of plant or animal outside its natural habitat) and in-situ (on-site) conservation and biological research. Students will explore, discover, and examine biology on zoo grounds using a multitude of disciplines and approaches. Utilizing specialized research tools, students from all grade levels will conduct hands-on experiments and inquiry-based/problem/project-based lessons on topics as diverse as habitat restoration, invasive species monitoring, wildlife corridors, animal nutrition, and animal enrichment. Zoo Miami has a partnered with M-DCPS since 1988 with the opening of a middle school Zoo Magnet program and partnered again in 2014 with the opening of BioTECH @ Richmond Heights 9-12. Both existing schools and the proposed program at Pine Lake Elementary will be partially housed at the District's Research Station @ Zoo Miami, a multi-million dollar facility located on-site at Zoo Miami.

### *Discovery Education*

In a district with over 356,000 students, ensuring consistent and equitable curriculum access for all learners is paramount. M-DCPS decided that one of the most effective ways to accomplish this was to build educator capacity to transform teaching and learning. The District turned to Discovery Education in order to infuse digital resources, complete with curriculum alignment and pacing guides, as well as targeted professional development into schools to make learning more relevant for students. Discovery Education has been providing the following services to M-DCPS for the last six years and these basic services will also be included at all three project schools:

- Integration of vetted digital content based on Discovery Education Streaming Plus and Discovery Education Science into Miami's student-focused portal;
- Curriculum alignment and custom-built pacing guides; and
- Customized, in-person and web-based professional development.

Research shows that when educators within Miami-Dade County Public Schools used Discovery Education Streaming Plus with students, they performed better on the science state assessment as compared to classrooms in which students were not engaged with multimodal resources from Discovery Education Streaming Plus (Leow 2013).

### *Everglades National Park*

The National Park Service's Everglades National Park has committed to providing curriculum-based, environmental education programs to the students of Miami Dade County since 1971. The park hosts more than 11,000 students from M-DCPS annually and provides

them with experiential learning experiences that cannot be replicated anywhere else in world.

Everglades Environmental Education programs are place-based, interdisciplinary, and appeal to multiple learning styles. Programs include field experiences at the Royal Palm and Shark Valley areas of the park, as well as residential camping programs at the Hidden Lake and Loop Road Environmental Education Centers.

Through the incorporation of the Everglades Education team, Pine Lake Elementary will collaboratively develop unique curricula for elementary aged students that will be uniquely designed for the school's magnet program and provided free of charge. Everglades Educational programs have a significant and positive influence on all outcomes of interest including content-related learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of Everglades National Park, and environmental stewardship. The programs will be high-quality and produce teachers who are better able to help their students meet *Florida State Standards* for science and social studies and will serve a diverse group of students who reflect the racial and ethnic makeup of Miami and South Florida. More importantly, these programs will provide the relevance necessary to help students make connections between what they learned and experienced in these programs and the role that individual behaviors have on natural environments. All programs are provided free of charge to schools, are curriculum-based, and help teachers meet state and national education standards, particularly in science and social studies. Program content emphasizes concepts taught in the classroom with real-world experiences in the park.

### **QUALITY OF PROJECT DESIGN**

*3) The extent to which the training or professional development services to be provided by the proposed project are of sufficient quality, intensity, and duration to lead to improvements in practice among recipients of those services.*

M-DCPS is committed to improving STEM education. The District is further committed to the priorities which will assure more students acquire the skills needed to succeed in STEM fields and improving the quality of math and science teaching. To this end, the magnet teachers for all three STEM-focused schools will be recruited and selected based on content knowledge, a history of effectiveness, and a desire to fully engage in the project.

Participating teachers will receive extensive front load training. The most intensive training will take place during the summer beginning in year two to minimize the impact on classroom instructional time. In the initial year, teachers at both STEM schools will be introduced to the use of technology platforms and the resources, and trained in problem/project-based learning (PbL). Teachers will also engage in ongoing professional activities and development throughout the year, designed to foster collaborative school-site teams, provide the opportunity for educators to expand their STEM content knowledge, and to acquire the knowledge and skills to design a rigorous curriculum and foster interaction between diverse groups of students. The instructional staff and leadership team at each school will receive PbL training from FIU, MDC, and Discovery Education.

#### ***Florida International University***

Problem/project-based learning and modeling instruction in STEM fields integrates content and pedagogy with the development of scientific models, essentially allowing students to

learn science as scientists. Teachers who utilize modeling and PbL embody a holistic approach to teaching and implement a flexible curriculum that supports STEM instruction across grade levels. FIU's STEM Transformation Institute is a national leader in modeling research as well as preparing teachers to implement modeling and PbL instruction in the classroom. This approach also allows for a flexible and solution-based approach to learning, where the curriculum is co-created by students and teachers, and the curriculum is alive. Modeling and PbL professional development includes three-weeks, or 120-hour summer workshops. Led by teacher leaders, these professional development workshops allow teachers to develop the skills and strategies to implement modeling and problem/project-based learning. Teachers will also receive extended opportunities for learning, and ongoing support throughout the academic year. Teacher-leaders will be selected at each school so that teachers are practicing and supporting their fellow teachers as a true professional learning community. The ability to support one another is a critical way to ensure that new revitalizing methods of teaching are sustainable.

### *Miami Dade College*

Professional development bridges the gap between individual users and helps organizations become more productive, produce higher quality software, and ultimately become more effective overall. At the forefront of technology use in the academic fields related to the *STEM Pathways Project* magnets, Miami Dade College employs content and software utilization experts in the fields of animation and design, mobile application development, network infrastructure design & networking, cybersecurity, and enterprise resource planning. MDC will provide subject area experts to provide logistic support and training to *STEM Pathways Project*

teachers utilizing software packages such as ERP, Maya, Harmony, Storyboard Pro, xCode, Android 6.0 Marshmallow, Wireshark, and Ettercap. Training will encompass all aspects of designing and planning successful STEM projects, crafting the driving questions, planning the assessment, mapping the projects, and managing the process. Also critical to this project, the training will incorporate equity issues into professional development activities including workshops to help participants discuss factors which limit female/minority pursuit of STEM, and strategies for reversing this trend, and will identify resources for implementing these strategies. Teachers will learn the principles of creating and managing standards-focused STEM projects and will engage in an intensive exploration of best practices in project design, assessment, and management.

### ***Discovery Education***

The Discovery Education professional development team is committed to the highest standards of professional learning grounded in research and successful practice. Professional development topics will include student collaboration, standards-based lesson planning, and digital media integration. Discovery is committing to collaboratively design professional learning plans that provide continuous improvement in teachers' skills by supporting professional learning communities via access to the Discovery Educator Network, addressing professional learning needs for both classroom teachers and administrators, and providing highly-trained and certified educators for all on-site and web-based professional learning experiences. For the purposes of the *STEM Pathways Project*, Discovery is committing to providing a two-day, technology-rich, achievement driven, professional development for Pine

Lake Elementary on the use of the elementary school Science Techbooks and webinar trainings for all Algebra 1 teachers at both Barbara Goleman Senior High School and Miami Southridge Senior High School on the use of the Math Techbooks.

Professional development stipends have been included in the budget to support the above mentioned professional development components. Job-embedded professional learning will continue throughout the school year. Professional development, as well as the commitment of support from identified partners, will assure that the schools will continue to train and support their own teachers as well as teachers new to the school.

### *Elam Leadership Institute*

The Elam Leadership Institute (ELI) is a national network of experts on leadership development that focus on assisting educational institutions with working with diverse populations to address achievement and connectedness of all stakeholders. Dr. Donna Elam, the CEO of the Elam Leadership Institute, is a recognized authority on diversity and cultural competence research and professional development. Dr. Elam, in collaboration with members of the Institute, provide technical assistance and professional development to help school districts with practical applications to bring about change in policy and practices in order to achieve equitable, academic, and socio-emotional outcomes. ELI will partner with the District to provide consultative support and professional development to the *STEM Pathways Project* teachers and school administrators. Through utilizing research and best practices, ELI will guide the District toward examining potential strategic solutions that develop culturally competent leadership and teaching in order to address issues around diversity and implicit bias.

The Elam Institute and Dr. Elam will provide professional development throughout the life of the grant through a combination of workshops, extended small group learning, job-embedded professional development, and Summer Institutes. Annual Professional development on diversity will be strategically planned and developed to assist a sustained implementation of the objectives of the grant, and the District's socioeconomic integration plan and efforts to prevent socioeconomic isolation through quality professional development on diversity.

Applying a step-by-step guide to extend data analysis and data team process, ELI will assist educators as they address the academic needs of a culturally diverse student population. In doing so, the professional development on diversity will equip educators with tools to provide high quality, world class instruction to their racially and socioeconomically diverse student body.

Some of the topics include:

- Comprehending how the historical context of desegregation informs current magnet schools' policies and practice;
- Operationalizing equity into the data analysis process through job-embedded instructional structures and processes in order to dive deeper into student data, and examine instruction with diverse student populations;
- Ensuring that implicit bias does not have a negative impact on the delivery of academic content;
- Knowing how confirmation bias relates to student achievement; and
- Ensuring that all students are held to high expectations for academic achievement without bias.

The Professional Development delivered by ELI will provide each magnet school with a continuum of support needed to understand educational issues around diversity, starting with an awareness of the issues discussing research and moving to a culturally competent mindset about diversity with job-embedded activities.

### **QUALITY OF PROJECT DESIGN**

*4) The extent to which the proposed project is supported by strong theory (as defined in this notice).*

The *STEM Pathways Project* proposes a strong theory for the achievement of the following objectives:

- *Reduce minority and socioeconomic isolation in all STEM Pathways Project schools* - the theory identifies two activities to address isolation. It is proposed that if the District targets priority neighborhoods and provides additional weighting to magnet applications from students residing in the priority neighborhoods, then there will be a greater probability of accepting students from priority neighborhoods upon the random selection of students from the applicant pool. This approach is contingent upon students from priority neighborhoods submitting their applications. Therefore, it is also proposed that if the District targets marketing efforts in priority neighborhoods, then there will be an increase in student interest and, as a result, the District expects an increase in student applicants. The District piloted this approach past year to assist underrepresented populations/communities that have not traditionally submitted magnet applications at the rate of other communities. The District conducted target marketing through social media

as well as direct mailing. This resulted in an increase of over 70% in the number of magnet applications from the targeted communities.

- *Increase academic achievement rates of all demographic groups in all STEM Pathways Project schools* - the theory proposes that student achievement can be impacted by student interest in content. Therefore, it is proposed that if students are engaged in hands-on, collaborative, problem/project-based learning activities, then there will be an increase in student participation and, as a result, an observable increase in student achievement on both formative and summative assessments.
- *Implement innovative STEM curricula specific to the magnet theme in each STEM Pathways Project magnet program/school* - the theory proposes that students that engage in an innovative STEM curriculum that is thematically tied to their interest will be actively involved and see their program of study through to completion. It is, therefore, expected to observe an increase in the percentage high school graduates as well as an increase in the number of students that will pursue a post-secondary degree or career in a STEM related field.
- *Increase capacity of core and magnet content teachers to deliver innovative curricula* - the theory suggests that when teachers engage in high-quality, professional learning in collaboration with project partners, teachers will be able to directly impact student performance when the professional learning is applied to the lessons/unit plans. With an increase in student success, it is more likely that core and magnet content teachers will continue to deliver innovative curricula with fidelity.

The proposed logic model addresses activities that will bring about change and the results expected at the District and the individual school sites. This logic model will keep all *STEM Pathways Project* participants moving in the same direction by providing a common language and point of reference.

## QUALITY OF MANAGEMENT PLAN

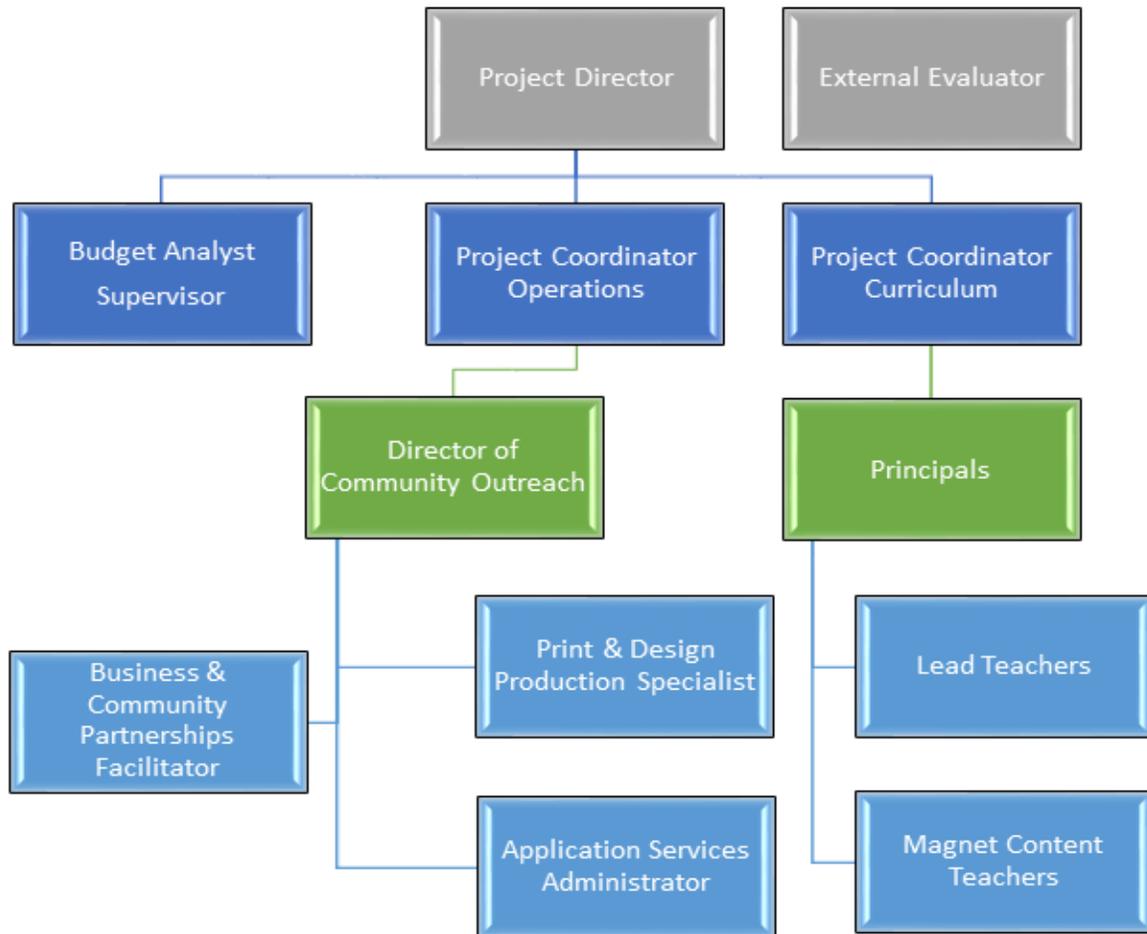
1) *The adequacy of the management plan to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, timelines, and milestones for accomplishing project tasks.*

Miami-Dade County Public Schools (M-DCPS or the District) has the experience and capacity to manage the MSAP grant effectively, with clearly defined responsibilities for highly qualified, diverse, and experienced project personnel. The responsibility for developing and maintaining the management of magnet schools is multi-tiered to guarantee a variety of perspectives and support from all levels of district and regional management; school site personnel; and community stakeholders. The District will make optimal use of its resources as we integrate all District, school, and community resources to achieve our objectives and implement and sustain our project, keeping in mind the District goal of improving academic achievement for all students, as detailed in M-DCPS' *Vision 20/20, Strategic Blueprint for 2015-2020*.

### Management Team Roles and Responsibilities

Management team key personnel have significant roles and responsibilities towards ensuring proper and efficient administration of the *STEM Pathways Projects*. The management structure and the description of responsibilities and major tasks are represented by the hierarchical diagram and tables below.

MANAGEMENT TEAM HIERARCHY



PROJECT DIRECTOR

The **Project Director** will oversee the *STEM Pathways Project* to ensure timely implementation within the projected budget. The Project Director will communicate and coordinate with:

- *District-level Personnel* to oversee support services and identify and solve any district level challenges to project implementation and/or progress.
- *Management Team Personnel* to monitor activities, including purchases made with MSAP funds; magnet theme implementation and curriculum development; professional development requests; and performance report preparation to ensure that performance measures are accomplished and the project budget is being utilized as approved in a timely manner.
- *School Site Personnel* to review progress toward meeting project-level objectives; evaluation feedback; and school specific needs or changes to the project.

## PROJECT COORDINATOR | CURRICULUM

The **Project Coordinator over Curriculum** will monitor and coordinate the day-to-day curricular operations of the project and provide the leadership needed to effectively guide the implementation of the *STEM Pathways Project* as proposed. The Project Coordinator over Curriculum will:

- Work closely with schools to ensure timely implementation of theme, curriculum development, and professional development.
- Monitor each school's progress towards meeting project goals and objectives.
- Work with each school to craft a sustainability plan, including searching for grant opportunities.
- Collect, organize, and provide data to the external evaluator.
- Complete and submit all Ad-Hoc and Annual Performance Reports in collaboration with school-site personnel and the External Evaluator.
- Review evaluation feedback and work directly with school sites to impact changes necessary.
- Ensure management plan objectives and timelines are met by team members.
- Assist with design and implementation of recruitment plan

## PROJECT COORDINATOR | OPERATIONS

The **Project Coordinator over Operations** will monitor and coordinate the day-to-day operations of the project and provide the leadership needed to effectively guide the implementation of the *STEM Pathways Project* as proposed. The Project Coordinator over Operations will:

- Monitor each school's progress towards meeting project objectives.
- Work with each school to craft a sustainability plan, including searching for grant opportunities.
- Coordinate all contracts with consultants and project partners.
- Collect, organize, and provide data to the external evaluator.
- Ensure management plan objectives and timelines are met by team members.
- Oversee non-personnel expenditures.
- Coordinate installation of all MSAP-funded resources & laboratories.
- Meet with Principal to coordinate professional development.
- Conduct data collection and analysis.
- Review evaluation feedback and work directly with school sites to impact changes necessary.
- Assist with recruitment efforts.
- Facilitate coordination of out-of-boundary transportation services with the Department of Transportation

## BUDGET ANALYST SUPERVISOR

The **Budget Analyst Supervisor** will monitor all aspects of the *STEM Pathways Project* budget. The Budget Analyst Supervisor will:

- Monitor Grant Availability Reports to ensure that grant funds are being expended as proposed and on time.
- Allocate funds as per the grant budget allocation plan.
- Monitor and assist with all grant-related procurement activities.
- Assure fiscal and property audit compliance.
- Monitor expenditures reported against circular A-87 reports.
- Compile all budget-related information, in collaboration with staff from the District's Financial Services Department, for the required Ad Hoc and APR reports.
- Maintain communications with the project director, and principals and district budget and management personnel to ensure that all fiscal controls are maintained and that funds are expended in a timely manner.
- Work directly with all project personnel to provide appropriate internal controls to ensure that project funds are utilized only for personnel, project activities, equipment and supplies, and professional development that are in the approved budget or a budget modification approved by the ED.
- Issue budget reports that list, in detail, all expenditures for the month and year by budget category.

## DIRECTOR OF COMMUNITY OUTREACH (*In-Kind*)

The **Director of Community Outreach** will be responsible for overseeing, executing, tracking effectiveness of and making necessary modifications to all aspects of the recruitment and marketing plan, including overseeing the student application process. The Director of Community Outreach will:

- Oversee all work created by the Print and Design Production Supervisor and the Application Service Supervisor, and Business & Community Outreach Facilitator.
- Design and implement the project marketing plan.
- Assist *STEM Pathways Project* schools with marketing their respective programs in order to recruit students from different social, economic, ethnic, and racial backgrounds into their schools; analyze project schools' demographic data and create targeted recruitment plans to promote diversity.
- Approve all marketing materials and administer print production press checks.
- Oversee the Magnet Application system, including the identification of and additional weighting of students in priority neighborhoods.
- Secure community input in the development of the marketing plan.
- Manage the project's marketing budget.
- Monitor and report magnet applicants and school enrollments.

### PRINT & DESIGN PRODUCTION SUPERVISOR ( 0.50 In-Kind)

The **Print and Design Production Specialist** will work with *STEM Pathways* schools and District personnel to produce quality recruitment materials. The Print and Design Production Specialist will:

- Produce all print and non-print marketing materials including print pieces, support signage, social media, and public advertisement.
- Develop all advertisement designs.
- Develop and deploy all web designs and web marketing materials.
- Coordinate magnet representation at all district-wide community events and fairs.
- Apply brand knowledge to brand all *STEM Pathways Project* schools.

### APPLICATION SERVICES SUPERVISOR ( 0.50 In-Kind)

The **Application Services Supervisor** will be responsible for the implementation, configuration, and management of online data systems utilized to identify and target priority neighborhoods as well as manage the online application system. The Application Service Supervisor will:

- Track and report all statistics related to the targeted priority neighborhoods.
- Monitor and report applicant and enrollment data to the Director of Community Outreach.
- Apply weights to all applicants originating from priority neighborhoods.
- Manage all student applications including the generation of acceptance and wait-list notifications.
- Design, implement, and maintain the District's Magnet Schools website

### BUSINESS & COMMUNITY PARTNERSHIPS FACILITATOR

The **Business and Community Partnerships Facilitator** will serve as a liaison between M-DCPS and community partners, businesses, and government agencies. An expert on desegregation strategies and Federal, State, and District policies and administrative procedures as well as policies and procedures of the U.S. Department of Education Office of Civil Rights, this individual will:

- Track all demographic data at each project school.
- Coordinate and track the implementation of professional development related to diversity, sensitivity, and inclusion.
- Integrate additional community partnerships outside the scope of the project plan.
- Engage business and community stakeholders in school decision making processes and

committees.

- Monitor schools for compliance and correct behaviors or practices that could lead to formal complaints.
- Investigate, facilitate, and resolve informal complaints.

### School Site Roles and Responsibilities

The following school site personnel are key to implementing the proposed project and for ensuring the desired outcomes for the project are attained.

#### PRINCIPALS *(In-Kind)*

**The Principals** will *have significant roles and responsibilities* towards ensuring proper and efficient administration of the *STEM Pathways Project*. The principals will:

- Work collaboratively with the Project Coordinator of Curriculum to hire qualified school-based staff including the lead teacher, and magnet-theme content teacher.
- Monitor grant objectives to ensure that milestones are met within the required timelines and that the intended impacts on students are achieved.
- Manage magnet lead teacher and magnet content teacher activities to support goal attainment as per the management plan objectives.
- Design theme-specific magnet curriculum in conjunction with the Project Coordinator of Curriculum, magnet lead teacher and magnet content teachers.
- Ensure the magnet curriculum is supported via responsible fiscal decisions and actions.
- Execute the Desegregation plan including, but not limited to, the design, implementation, and reporting of the efficacy of the Summer Pathways Program, the FastPATH Labs, and the Parent Pathways Program.
- Report all data as required by the external evaluator, project coordinator, and the management plan objectives.
- Oversee all academic monitoring and support programs.

#### LEAD TEACHERS

**The Lead Teachers** will coordinate daily logistics and operational activities of the magnet school program(s). These individuals are responsible for monitoring and ensuring that grant objectives are addressed and are the primary source for gathering all school-site artifacts in support of the objectives. The Lead Teachers will:

- Assist with the identification of appropriate personnel qualified to teach the unique magnet curricula.

- Recruit students to prevent minority group isolation.
- Assist magnet school principals and teachers with the implementation of the specialized magnet theme.
- Facilitate the development and implementation of the unique magnet program curricula in collaboration with the Magnet-Theme Content Teachers.
- Coordinate community resources related to the magnet school program; market the magnet program.
- Monitor and report project outcomes in collaboration with school administration including student achievement, reduction of minority group isolation, professional development, curriculum design, parent and community/business partnerships and input.
- Collaborate with teachers and provide coaching, mentoring, and training as necessary to ensure student success.
- Lead the design team that will develop the unique magnet curriculum using Project/Problem-Based Learning as an instructional strategy by which to increase achievement rates for all demographic groups.
- Work collaboratively with District staff to develop the summer institute for all teachers.
- Work closely with parents, community, and business partners to build long-lasting relationships.

### MAGNET-THEME CONTENT TEACHERS

The Magnet-Theme Content Teachers will assist their school's *STEM Pathways* Lead Teacher and project partners in developing magnet strand-specific curricula, designing authentic, experiential, and interdisciplinary projects related to the magnet theme, and delivering quality content in the specialized magnet classes. The Magnet-Theme Content Teachers will:

- Integrate problem/project-based learning as an instructional strategy.
- Design and deliver unit plans designed to support the innovative magnet curriculum.
- Work directly with project partners to design lessons that engage students in collaborative, hands-on learning.
- Provide a climate of inclusion and cooperation in their classrooms to support retention of students in the magnet.
- Accurately report grades related to program objectives.
- Oversee parent booster associations.

### EXTERNAL EVALUATOR

The **External Evaluator** will conduct formative and summative evaluations to assess whether the GPRA measures and project outcomes are attained and assist with preparing the annual and final performance reports required by the United States Department of Education (ED). The External Evaluator will:

- Design all data-collection instruments, rubrics, and surveys.
- Develop all interview and observation protocols.
- Conduct tri-annual school-site visits and prepare visit reports.
- Conduct school-site interviews, focus groups, observations and data collection.
- Analyze all district/school quantitative/qualitative data to address performance measures found in the evaluation plan.
- Assist with preparing the annual and final performance reports required by the United States Department of Education (ED).

### MANAGEMENT TIMELINE MATRIX

**KEY**

**PD**-Project Director; **PCC**-Project Coordinator Curriculum; **PCO**-Project Coordinator Operations; **DCO**-Director of Community Outreach; **PS**-Production Supervisor; **PF**-Partnership Facilitator; **AS**-Application Services Supervisor ; **P**-Principal; **LT**-Lead Teacher; **MT**-Magnet Teacher; **BA**-Budget Analyst Director; **EE**-External Evaluator

 Grant Activities/Tasks	 Recruitment & Marketing Activities/Tasks
 Operational Activities/Tasks	 Curriculum Activities/Tasks

Action	Responsible Parties											Annual Timeline	
	P D	P C C	P C O	D C O	P S	P F	A S	P	L T	M T	B A		E E
Appoint Management Staff	Operational												Oct 2017
Appoint Lead Teachers	Operational	Operational	Operational					Operational					Nov 2017
Appoint Magnet Teachers	Operational	Operational	Operational					Operational	Operational				Dec 2017
Budget Monitoring & Reporting	Operational							Operational			Operational		Daily
Procurement of Magnet Equipment & Supplies	Operational	Operational	Operational				Operational	Operational	Operational				Year-round
Partnership Development	Curriculum	Curriculum	Curriculum				Curriculum	Curriculum	Curriculum				Jan 2018

Action	Responsible Parties											Annual Timeline	
	P D	P C C	P C O	D C O	P S	P F	A S	P	L T	M T	B A		E E
Curriculum Development													Jan 2018 (Year 1) May - Aug (Annually)
School Branding & Marketing Material Development													Feb 2018
Identify Priority Neighborhoods													Oct (Annually)
Recruitment of Students & Events													Oct - Jan (Annually)
Marketing													Oct - Jan (Annually)
Weighting of Applicants													Feb (Annually)
Magnet Student Selection													Mar (Annually)
Teacher Summer Institute													July (Annually)
iCode Camps													Jun-July (Annually)
Summer Pathway Program													Aug (Annually)
Academic Monitoring & Support													Year-round
Parent Pathway Program													Aug - Jun (Annually)
FastPATH Lab Implementation													Aug - Jun (Annually)
EESAC Meeting													Monthly
Curriculum Council Meeting													Bi-Monthly
Magnet Advisory Board Meeting													Quarterly

Action	Responsible Parties											Annual Timeline	
	P D	P C C	P C O	D C O	P S	P F	A S	P	L T	M T	B A		E E
Performance Objective Monitoring & Support	■	■	■					■	■				Year-round
Evaluation Data Collection	■	■	■				■	■	■	■	■	■	Year-round
Ad-Hoc Reporting/Annual Performance Reporting	■	■	■					■	■	■	■	■	May/Oct (Annually)
Formative Evaluation Visits/Reports								■	■	■		■	Triannually
School Demographic Analysis	■	■	■				■	■	■				Quarterly

**District & Regional Roles and Responsibilities**

Under the leadership of Alberto M. Carvalho, Superintendent of Schools, the following *district-level and region offices each have significant roles and responsibilities* towards ensuring proper and efficient administration of the *STEM Pathways Project*.

- **Office of Academics and Transformation** provides guidance and support at the district/region/school level relative to curriculum, interpretation of compliance/policy requirements, and best practices; and monitors the fidelity of implementation and compliance with local/state/federal requirements. Curriculum departments include all core disciplines as well as Advanced Academics, Bilingual and World Languages, and Career and Technical Education.
- **Innovation and School Choice** manages the design and implementation of district-wide innovation including school choice, and provides direct oversight to the office of School

Choice & Parental Options as well as Instructional Technology and Instructional Materials. The office is responsible for initiatives that address objectives in M-DCPS' *Vision 20/20 Strategic Blueprint for 2015-2020* to increase minority student participation in magnet and choice programs. Initiatives encompass both school-based and district-based strategies, including developing strategic marketing plans based on program demographic data, and direct marketing to underserved communities. The office enables MSAP grant activities by providing support and expertise in the purchase and deployment of computer systems, digital content, teacher training, in-class support, and modeling.

- ***School Choice & Parental Options (SCPO)*** will provide the primary management of the *STEM Pathways Project* and will coordinate services that will be provided by key district and region offices, and *STEM Pathways* school principals. Major functions of SCPO include: developing, marketing, implementing, and monitoring magnet and choice programs in the District; monitoring the racial/ethnic balance of the District's magnet school programs; reviewing student achievement in magnet and choice programs; facilitating partnerships with local business and industry communities, institutions of higher learning, and governmental entities; supervising the expenditure of district magnet funds; and addressing parent inquiries related to educational choice options.
- **Offices of Exceptional Student Education (ESE) and Student Support** serve children and families by developing, coordinating, and overseeing programs that support students, including those with disabilities, in order to ensure that curriculum, instructional and behavioral practices are tailored to meet their educational needs. Programs and services

include early identification and intervention, progress monitoring, instructional support, wellness/mental health counseling, psycho-educational evaluation and placement, transition support, and truancy prevention.

- **Information Technology (IT)** directs the District’s IT strategy and maintains the data integrity for the information systems and network infrastructure for schools and administrative locations, District employees, and students, and oversees the department of Assessment, Research & Data Analysis.
- **Assessment, Research, & Data Analysis (ARDA)** implements procedures for quality assessment, data collection, and data analysis in order to ensure the accuracy and validity of student membership data and student achievement data that drive the decision-making process; and provides select data to the project’s external evaluators.
- **Office of Intergovernmental Affairs, Grants Administration (OIAGA), & Community Engagement** handles legislative issues; intergovernmental relations on local, state, federal and international levels; grants management; compliance with the *2001 Reauthorization of the Elementary and Secondary Education Act (ESEA)*; and the *Every Student Succeeds Act (2015)*; and community engagement activities, including school volunteer and business partnership programs, student internships, and other forms of support for student learning and parent involvement.

The *Intergovernmental Affairs team* advances the School Board’s legislative program. M-DCPS has a vested interest in the legislative process, as a high percentage of the District’s operating revenues come directly from state funds and the state-mandated Required Local Effort (RLE) millage levy. The office also manages 18 education compacts with various municipalities and the county. These partnerships are a vehicle for

stronger community relations and serve to leverage community resources for education needs.

*Grants Administration* maximizes federal, state, local and private funding to support programs designed to improve student achievement and educator effectiveness and works with staff from all areas of the District to facilitate grant submission and align grant proposals with District priorities. In addition, Grants Administration serves as the liaison for the School Board, the Superintendent, and project managers in all official business with federal, state, and/or other agencies that provide funds for special projects.

The *Community Engagement team* encourages community members to support student success and enrich the school environment by volunteering as mentors and tutors. The team also encourages local businesses to provide internships and student incentives. The goal is to enhance communication with parents and the community-at-large by providing opportunities for them to play an important role in public education. By mobilizing and channeling resources into the school system, the team is able to create partnerships that impact student learning and achievement.

- **Financial Services** provides for the effective, efficient, and timely management of District financial transactions including planning, estimating, and controlling revenues and expenditures; receiving and investing revenues; disbursing payroll and vendor payments; all procurement activity; and accounting for all transactions in an a manner meeting Florida Department of Education and Government Accounting Standards Board guidelines..
- **The Parent Academy (TPA)** is a district-wide initiative that supports community and family involvement, and is designed to bridge the gap between home and school through

the provision of valuable resources. The Parent Academy supports families to become more involved by facilitating training, information and assistance needed. Ongoing services and activities for *STEM Pathways* schools will include monthly parent workshops in English, Spanish, and Haitian Creole, including resource fairs and family learning events customized to meet the needs of each school population as identified by family surveys.

- **Department of Transportation** provides safe, timely, effective, and efficient transportation of students to and from schools. The Department of Transportation will design and implement a transportation plan to provide *STEM Pathways Project* students the opportunity of attending a *STEM Pathways* magnet school outside of their transportation boundary zone. This service will have the potential to enable parents to make quality educational decisions for their children without the limitations and challenges caused by transportation logistics. The impact of providing safe, reliable, and timely transportation to the magnet programs, will likely result in student retention and increased student achievement.
- **Region Offices** provide administrative oversight and support to principals in more than 100 schools each. The region offices will provide direct support and guidance to principals at the three schools.

### Project Objectives and Tasks

The District will make optimal use of all of the identified District, school, parent, and community resources to *achieve our objectives*, detailed in the table below, and by implementing and sustaining our project, keeping in mind the District goal of improving academic achievement, as outlined in M-DCPS' *Vision 20/20, Strategic Blueprint for 2015-2020*.

Performance Measure		Objective	Milestone	Artifact(s)	
		Designation	Target Threshold	Timeline	
<b>OBJECTIVE 1: Reduce minority and socioeconomic isolation in each STEM Pathways magnet.</b>					
1.1a-c (PSB)	Proposed schools will reduce minority group isolation by reflecting the District-wide Black enrollment within the target threshold	GPRA, OUTCOME	30% Deviation 25% Deviation 20% Deviation 15% Deviation	September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	District-generated school enrollment statistics
1.2a-c (PSB)	Proposed schools will reduce minority group isolation by reflecting the District-wide Hispanic enrollment within the target threshold	GPRA, OUTCOME	30% Deviation 25% Deviation 20% Deviation 15% Deviation	September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	District-generated school enrollment statistics
1.3a-c (PSB)	Proposed schools will reduce socioeconomic isolation by reflecting the District-wide enrollment of students on free/reduced lunch within the target threshold	GPRA, OUTCOME	20% Deviation 17% Deviation 13% Deviation 10% Deviation	September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	District-generated school enrollment statistics
1.4a-c (PSB)	Percentage of magnet students from each of the proposed schools who identify as having increased participation with students of varying racial and/or social economic backgrounds.	OUTCOME	70% 80% 85% 90%	September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	Quantitative Student Surveys & Focus Groups
1.5a-c (PSB)	Percentage of magnet teachers from each of the proposed schools who identify that students have increased participation with students of varying racial and/or social economic backgrounds.	OUTCOME	70% 80% 85% 90%	September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	Quantitative Teacher Surveys & Focus Groups
1.6a-c (PSB)	The number of applicants to each of the proposed schools from each school's identified priority neighborhoods will increase by the target threshold as compared to the baseline data prior to project implementation.	OUTCOME	5% 10% 15% 20% 25%	September 30, 2018 September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	SmartChoice Applicant Pool Reports
1.7a-c (PSB)	The enrollment at each of the proposed schools from each school's identified priority neighborhoods will increase by the target threshold as compared to the baseline data prior to project implementation.	OUTCOME	2% 3% 5% 7% 8%	September 30, 2018 September 30, 2019 September 30, 2020 September 30, 2021 September 30, 2022	Web-based Applicant Pool Reports & District Generated Enrollment Statistics from District SIS
1.8a-c (PSB)	Each school will design and revise annually a recruitment/marketing plan to reduce minority and socioeconomic isolation in each magnet program.	OUTCOME	1 plan	September 30, 2018 through September 30, 2022	Recruitment & Marketing Plan; Database of Recruitment Activities; Roster of Participants in Planning; Established Recruitment/Marketing Committee including Parents, Students, Teachers, Administrators, Partners, and Community Agencies; Marketing Materials in multiple languages; Agendas and sign in sheets for meetings
<b>OBJECTIVE 2: Design and implement innovative magnet programs that incorporate the use of specific instructional strategies to increase student achievement and reduce socioeconomic and racial isolation.</b>					
2.1a (P)	Magnet students at Pine Lake Elementary will have participated in 300 minutes of magnet specific instruction ever two weeks.	OUTCOME	300 min	September 30, 2019 through September 30, 2022	Grade-specific course schedules from each school's SIS identifying magnet courses
2.2a-b (SB)	Magnet students at Miami Southridge Senior High and Barbara Goleman Senior High will have participated in 400 minutes of magnet specific instruction every two weeks.	OUTCOME	400 min	September 30, 2019 through September 30, 2022	Grade-specific course schedules from each school's SIS identifying magnet courses
2.3a-c (PSB)	Each magnet program in each school will annually develop and delivered magnet theme related unit plans that demonstrate alignment with State standards and reflect the innovative, instructional methodologies	PROCESS	4 unit plans	September 30, 2019 through September 30, 2022	Unit plans with project specific, innovative instructional strategies that are aligned to the magnet theme; 10 student samples per unit plan from a diverse pool of students
2.4a-c (PSB)	Each magnet student in each school will annually produce problem/project-based learning products.	PROCESS	1 project	September 30, 2019 through September 30, 2020	Evidence of public forum in which each project is presented (pictures, videos, participant feedback)
		PROCESS	2 projects	September 30, 2021 through September 30, 2022	
2.5a-c (PSB)	Increase retention of students in the magnet program and program completion.	PROCESS	< 15 percent attrition annually per cohort	September 30, 2019 through September 30, 2022	Annual student demographic download and statistical comparison
2.6a-c (PSB)	Percentage of students interested in STEM careers/post-secondary field of study.	PROCESS	70% minimum annually	September 30, 2019 through September 30, 2022	Annual Student Goal Survey Results

Performance Measure		Objective Designation	Milestone Target Threshold	Timeline	Artifact(s)
<b>OBJECTIVE 3: Increase capacity of core and magnet themed teachers to deliver innovative theme-based curricula using specific instructional strategies and to promote cultural competency.</b>					
3.1a-c (PSB)	Annually, all magnet schools will have completed a plan for professional development (PD) training in project/problem-based learning and instructional strategies related to the school's magnet specific theme(s).	PROCESS	1 plan	September 30, 2018 through September 30, 2022	PD staff survey results; PD Calendar demonstrating training in project/problem-based learning; PD plan demonstrating training in project/problem-based learning
3.2a-c (PSB)	Classroom teachers at each school will have completed professional development training in project-based learning and instructional strategies related to each school's magnet theme(s).	PROCESS	Average of 25 cumulative hours per teacher	September 30, 2018 through September 30, 2020	PD sign in sheets; PD presentation materials; PD evaluation report
		PROCESS	Average of 50 cumulative hours per teacher	September 30, 2021 through September 30, 2022	
3.3a-c (PSB)	Annually, classroom teachers at each school will evidence use of instructional strategies learned through PD with their students.	OUTCOME	2 lesson plans per teacher	September 30, 2018 through September 30, 2022	Lesson plan that shows evidence of implementation of instructional strategies learned through PD
3.4a-c (PSB)	Classroom teachers at each school will have completed professional development training in technology integration related to each school's magnet theme(s).	PROCESS	Average of 25 cumulative hours per teacher	September 30, 2018 through September 30, 2020	PD sign in sheets; PD presentation materials; PD evaluation report
		PROCESS	Average of 50 cumulative hours per teacher	September 30, 2021 through September 30, 2022	
3.5a-c (PSB)	Annually, classroom teachers at each school will evidence use of technology integration strategies learned through PD with their students.	OUTCOME	2 lesson plans per teacher	September 30, 2018 through September 30, 2022	Lesson plan that shows evidence of implementation of instructional strategies learned through PD
3.6a-c (PSB)	Classroom teachers at each school will have completed professional development training in diversity/sensitivity/inclusion.	PROCESS	1 minimum per year	September 30, 2018 through September 30, 2022	PD sign in sheets; PD presentation materials; PD evaluation report
<b>OBJECTIVE 4: Increase percentage of magnet students, including those from major ethnic, racial and socioeconomic subgroups, who achieve learning gains on statewide assessments.</b>					
4.1a-c (PSB)	Percentage of magnet students enrolled at each magnet school at proficiency on state ELA assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.2a-c (PSB)	Percentage of magnet students enrolled at each magnet school demonstrating learning gains on state ELA assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.3a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school at proficiency on state ELA assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.4a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school demonstrating learning gains on state ELA assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.5a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school at proficiency on state ELA assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.6a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school demonstrating learning gains on state ELA assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.7a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school at proficiency on state ELA assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.8a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school demonstrating learning gains on state ELA assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.9a-c (PSB)	All students scoring below proficiency or not demonstrating learning gains in ELA will be scheduled for interventions designed to raise the benchmark to grade-level.	OUTCOME	100%	September 30, 2019 through September 30, 2022	Personalized intervention plan for identified students; Calendar of scheduled interventions
4.10 a-c (PSB)	Students scoring below proficiency or not demonstrating learning gains in ELA will participate in interventions designed to raise the benchmark to grade-level.	OUTCOME	min 70% rate	September 30, 2019 through September 30, 2022	Intervention sign in sheets; Cumulative, individualized participation rate

# MSAP 2017 Program Objectives

Performance Measure		Designation	Target Threshold	Timeline	Artifact(s)
4.11a-c (PSB)	Percentage of magnet students enrolled at each magnet school at proficiency on state Math assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.12a-c (PSB)	Percentage of magnet students enrolled at each magnet school demonstrating learning gains on state Math assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.13a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school at proficiency on state Math assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.14a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school demonstrating learning gains on state Math assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.15a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school at proficiency on state Math assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.16a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school demonstrating learning gains on state Math assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.17a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school at proficiency on state Math assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.18a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school demonstrating learning gains on state Math assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.19a-c (PSB)	All students scoring below proficiency or not demonstrating learning gains in Math will be scheduled for interventions designed to raise the benchmark to grade-level.	OUTCOME	100%	September 30, 2019 through September 30, 2022	Personalized intervention plan for identified students; Calendar of scheduled interventions
4.20a-c (PSB)	Students scoring below proficiency or not demonstrating learning gains in Math will participate in interventions designed to raise the benchmark to grade-level.	OUTCOME	min 70% rate	September 30, 2019 through September 30, 2022	Intervention sign in sheets; Cumulative, individualized participation rate
4.21a-c (PSB)	Percentage of magnet students enrolled at each magnet school at proficiency on state Science assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.22a-c (PSB)	Percentage of magnet students enrolled at each magnet school demonstrating learning gains on state Science assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.23a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school at proficiency on state Science assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.24a-c (PSB)	Percentage of Black magnet students enrolled at each magnet school demonstrating learning gains on state Science assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.25a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school at proficiency on state Science assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	
4.26a-c (PSB)	Percentage of Hispanic magnet students enrolled at each magnet school demonstrating learning gains on state Science assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019	State assessment results
			80%	September 30, 2020	
			85%	September 30, 2021	
			90%	September 30, 2022	
4.27a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school at proficiency on state Science assessments will increase annually by the minimum threshold.	GPRA, OUTCOME	3%	September 30, 2019	State assessment results
			5%	September 30, 2020	
			7%	September 30, 2021	
			9%	September 30, 2022	

Performance Measure		Objective		Milestone		Artifact(s)
		Designation	Target Threshold	Timeline		
4.28a-c (PSB)	Percentage of FRL magnet students enrolled at each magnet school demonstrating learning gains on state Science assessments will increase annually.	GPRA, OUTCOME	75%	September 30, 2019		State assessment results
			80%	September 30, 2020		
			85%	September 30, 2021		
			90%	September 30, 2022		
4.29a-c (PSB)	All students scoring below proficiency or not demonstrating learning gains in Science will be scheduled for interventions designed to raise the benchmark to grade-level.	OUTCOME	100%	September 30, 2019 through September 30, 2022		Personalized intervention plan for identified students; Calendar of scheduled interventions
4.30a-c (PSB)	Students scoring below proficiency or not demonstrating learning gains in Science will participate in interventions designed to raise the benchmark to grade-level.	OUTCOME	min 70% rate	September 30, 2019 through September 30, 2022		Intervention sign in sheets; Cumulative, individualized participation rate
4.31a-c (PSB)	Magnet students in each magnet program at each school will achieve a grade of "C" or higher on magnet projects graded by rubrics	OUTCOME	70% scoring "C" or better	September 30, 2019 through September 30, 2020		Electronic gradebook report; Evidence of projects
		OUTCOME	80% scoring "C" or better on two projects	September 30, 2021 through September 30, 2022		
4.32 (SB)	Magnet students in each magnet high school program will attain and maintain a minimum unweighted GPA of 2.0.	OUTCOME	70% of magnet students	September 30, 2019 through September 30, 2020		School-provided GPA Report
		OUTCOME	100% of magnet students	September 30, 2021 through September 30, 2022		
OBJECTIVE 5: Ensure participation of all stakeholders (community members, parents, students, faculty, and project partners) in making decisions which affect instruction and the delivery of the project objectives.						
5.1a-c (PSB)	Educational Excellence School Advisory Committees (EESAC) will be represented by at least three (3) community/business representatives (including members of partnering organizations), five (5) parents, students, and teachers.	OUTCOME	100%	September 30, 2019 through September 30, 2022		EESAC Rosters
5.2a-c (PSB)	Magnet schools will complete a targeted partnership outreach plan related to their school's magnet theme.	PROCESS	1 plan per year	September 30, 2018 through September 30, 2022		Partnership Outreach Plan
5.3a-c (PSB)	The magnet theme(s) and instructional strategies will be incorporated into the School Improvement Plan (SIP) at each school and reviewed/approved by EESAC.	OUTCOME	100%	September 30, 2019 through September 30, 2022		SIP Plans
5.4a-c (PSB)	Magnet programs at each school will establish a parent support organization (Parent Booster Association) that meets quarterly to support magnet planning, magnet implementation, and magnet extracurricular support.	PROCESS	4 meetings per year	September 30, 2019 through September 30, 2022		Meeting Agenda; Meeting Sign in Sheets; Meeting Minutes
5.5a-c (PSB)	Magnet programs at each school will establish an Advisory Board comprised of community members related to the magnet theme, project partners, the principal, and other experts in a field related to the magnet theme that meets at least twice a year to provide theme-related degree or career input to the magnet program.	PROCESS	2 meetings per year	September 30, 2018 through September 30, 2022		Meeting Agenda; Meeting Sign in Sheets; Meeting Minutes
5.6a-c (PSB)	Magnet programs at each school will establish a student governing association or ensure magnet student representation in existing school-wide student governing associations	PROCESS	100%	September 30, 2019 through September 30, 2022		Meeting Agenda; Meeting Sign in Sheets; Meeting Minutes

**QUALITY OF MANAGEMENT PLAN**

2) How the applicant will ensure that a diversity of perspectives are brought to bear in the operation of the proposed project, including those of parents, teachers, the business community, a variety of disciplinary and professional fields, recipients or beneficiaries of services, or others, as appropriate.

The management plan will ensure that a *diversity of perspectives* is brought to bear in the operation of the *STEM Pathways* plans as we work to achieve the following outcomes: the reduction of socioeconomic and minority group isolation in selected STEM programs, increased academic achievement rates of students within demographic groups in selected STEM programs, implementation of innovative STEM curriculum at each *STEM Pathways* school, increased capacity of core and specialized teachers to deliver innovative STEM curriculum at each *STEM Pathways* school, and increased local, regional, and national partnerships to provide access to real world STEM experiences in each *STEM Pathways* magnet. Just as a broad cross-section of stakeholders and district and school-site personnel, parents and community partners were involved in planning the *STEM Pathways Project*, so shall a cross-section be involved in the operation of the proposed project.

The engagement of teachers, parents, community members, and members of the business community, including community project partners, will also ensure that a *diversity of perspectives* are brought to bear in the operation of the proposed project. Teachers, parents, students, and community members will serve on the Educational Excellence School Advisory Council (EESAC) at each *STEM Pathways* school. The council will bring together all stakeholders and ensure their voices are heard by giving them an authentic role in decision-making, which impacts instruction and the delivery of educational programs both in the magnet programs and the school as a whole.

Teachers will be actively involved in curriculum development, as well as working with project partners including Miami Dade College (MDC) and Florida International University (FIU), to design lessons, select appropriate resources, and design real-world STEM experiences. The perspectives of community partners, MDC and FIU were invaluable in identifying paths to college and careers, identifying industry needs, and providing the insight for resource and curriculum development, and their participation, as well as the participation of other community partners, will be critical to the successful operation of the project. (Tours of Miami-Dade’s Miami Animation and Gaming International Complex within the School of Engineering Technology (MAGIC) at the Miami Dade College Wolfson campus, for example, provided a vision for development of the animation lab for Miami Southridge Senior High, and a planned pathway to college and a career in Miami’s fast growing movie industry.) As we go forth with implementation and operation of the project, the importance of partnership perspectives will be crucial to the operation of each of the *STEM Pathways* plans.

Because families are crucial in the decision-making process in the selection of schools—24 percent of parents report they moved to their current neighborhood so their children could attend their current school (“Expanding Choice in Elementary and Secondary Education” Croft, Greene, Loveless et. al 2010)—they play a major role in the recruitment and retention of students. When parents take an active role in the school selection process, attrition of students is limited. With this in mind, it is important that the school environment is inclusive and welcoming. Diverse opinions will be sought by including parents in the school site decision-making organizations including the Magnet Advisory Board, individual Magnet Booster Parent Associations, the Parent Teacher Student Association (PTSA), and the Educational Excellence School Advisory Committee (EESAC). Parents’ opinions and participation will also be

encouraged when planning annual events such as the Magnet Open House, Career Days, and field experiences. Magnet students will also have the opportunity to express diverse opinions as they participate in Student Government, the Magnet Advisory Board, the Parent Teacher Student Association (PTSA), and the Educational Excellence School Advisory Committee (EESAC).

To ensure that a *diversity of perspectives* are brought to bear in the operation of the proposed project, all three project schools will utilize the action plan below (Table 1), and adapt, reflect upon, and revise the action plan yearly to ensure equity in the input of all stakeholders, including input from parents, administrators, teachers, business and community members, a variety of disciplinary and professional fields, recipients or beneficiaries of services, and organizations that support overcoming gaps in access for underrepresented students in STEM and advanced college readiness coursework (Table 2).

School-Site Project Operational Action Plan			
Event	Members	Purpose	Frequency
Parent, Teacher, Student Association (PTSA) General Meeting	<ul style="list-style-type: none"> <li>● PTSA Members including parents, students, and teachers.</li> <li>● PTSA Board</li> <li>● School Admin</li> </ul>	<ul style="list-style-type: none"> <li>● Review school-wide functions (including curricular and extracurricular) and concerns.</li> <li>● Proffer input and resolutions from as many stakeholders as possible.</li> </ul>	Quarterly
PTSA Board Meeting	<ul style="list-style-type: none"> <li>● PTSA Board Members</li> <li>● School Admin</li> </ul>	<ul style="list-style-type: none"> <li>● Prepare for PTSA General Meetings</li> <li>● Discuss budgetary items and concerns</li> <li>● Establish sub-committees to address concerns brought forth by school administration.</li> </ul>	Monthly

School-Site Project Operational Action Plan			
Event	Members	Purpose	Frequency
Curriculum Council Meeting	<ul style="list-style-type: none"> <li>School Leadership Council including Student Services, Lead Teachers, Administration, and Dept. Chairpersons</li> </ul>	<ul style="list-style-type: none"> <li>Review and address curriculum concerns and needs.</li> <li>Review and address curriculum calendars.</li> <li>Review and address school-wide deficiencies or areas of concern.</li> </ul>	Bi-Monthly
Educational Excellence School Advisory Committee (EESAC) Meeting	<ul style="list-style-type: none"> <li>School Administration</li> <li>EESAC Council comprised of students, parents, business partners, community organizations, teachers, and school support staff.</li> <li>Meeting is open to all members of the public and published on a public calendar on the school website and available at the school site.</li> </ul>	<ul style="list-style-type: none"> <li>Responsible for final decision making at the school relating to implementation of the Florida state system of school improvement and accountability. (Board Policy 2125) and (Florida State Statute 1001.452)</li> <li>Implement the state system of school improvement and accountability, assist in the preparation and evaluation of the School Improvement Plan, and assist in the preparation of the school's annual budget. (Board Policy 2125)</li> </ul>	Monthly

School-Site Project Operational Action Plan			
Event	Members	Purpose	Frequency
Magnet Advisory Board Meeting  (one per magnet)	<ul style="list-style-type: none"> <li>● Business and Community partners (see Table 2)</li> <li>● Magnet-Specific industry professionals</li> <li>● Magnet Lead Teacher</li> <li>● Magnet Teachers</li> <li>● School Administration</li> <li>● Post-Secondary, Magnet-Specific instructors/profess ors/deans</li> <li>● Partnering “feeder” school leadership teams</li> </ul>	<ul style="list-style-type: none"> <li>● Provide quarterly input into magnet curriculum and its implementation to ensure that it is current with business practices and college/university curricular frameworks.</li> <li>● Provide relevant opportunities through internships and volunteer events.</li> <li>● Assist in college/career planning and long-term success of magnet.</li> <li>● Provide mentoring opportunities for magnet strand students.</li> <li>● Provide support for plans for overcoming gaps for students underrepresented in STEM</li> </ul>	Quarterly

School-Site Project Operational Action Plan			
Event	Members	Purpose	Frequency
Magnet Booster Parent Associations  (one per magnet)	<ul style="list-style-type: none"> <li>● Magnet Lead Teacher</li> <li>● Magnet Teachers</li> <li>● School Administration</li> <li>● Magnet Booster Parent Association Board Members</li> <li>● Magnet parents</li> </ul>	<ul style="list-style-type: none"> <li>● Provide quarterly input into magnet curriculum and its implementation to ensure that it is current with business practices and college/university curricular frameworks.</li> <li>● Provide relevant opportunities through volunteer events.</li> <li>● Provide mentoring opportunities for magnet strand students.</li> <li>● Provide support for plans for overcoming gaps for students underrepresented in STEM through assistance with recruitment events</li> <li>● Organize fundraising events to assist with the sustainability of the magnet program.</li> </ul>	Quarterly

Table 2 (below) identifies educational, community-based, and business entities from which schools will seek out input when establishing Magnet Advisory Boards, PTSA committees, EESAC representation, and post-secondary/business internship opportunities. The list below will also be revisited annually by each of the project schools and modified to include any additional representation to benefit the operation of the proposed project and to insure goals are met.

Pine Lake Elementary School			
Magnet	Educational	Community	Business
Zoology & Botany Magnet	<ul style="list-style-type: none"> <li>● Richmond Heights Middle Zoo Magnet</li> <li>● BioTECH @ Richmond Heights 9-12</li> <li>● MDC School of Science</li> <li>● FIU College of Arts, Science, &amp; Education</li> </ul>	<ul style="list-style-type: none"> <li>● Friends of the Everglades</li> <li>● Everglades Foundation</li> <li>● Florida Native Plant Society</li> <li>● National Audubon Society</li> <li>● Miami Pine Rockland Coalition</li> <li>● Richmond Heights Homeowner’s Association</li> <li>● Sierra Club</li> <li>● Children’s Trust</li> <li>● The Children’s Movement</li> </ul>	<ul style="list-style-type: none"> <li>● Zoo Miami</li> <li>● Fairchild Tropical Botanic Garden</li> <li>● Everglades National Park</li> <li>● Silent Natives Nursery, Inc.</li> <li>● Deering Estate</li> </ul>
Miami Southridge Senior High School			
Magnet	Educational	Community	Business
Business Innovation & Management	<ul style="list-style-type: none"> <li>● MDC School of Business</li> <li>● FIU School of Business</li> </ul>	<ul style="list-style-type: none"> <li>● The Beacon Council (Representing over 27 different industries including Business Development and Information Technology)</li> </ul>	<ul style="list-style-type: none"> <li>● Baptist Health of South Florida</li> <li>● South Florida Educational Federal Credit Union</li> <li>● M-DCPS Information Technology Services</li> <li>● SAP Systems</li> </ul>

<b>Miami Southridge Senior High School</b>			
<b>Magnet</b>	<b>Educational</b>	<b>Community</b>	<b>Business</b>
Design, Animation, & Gaming	<ul style="list-style-type: none"> <li>MDC’s Miami Animation &amp; Gaming International Complex</li> </ul>	<ul style="list-style-type: none"> <li>Schiver Entertainment Foundation</li> <li>eMerge Americas</li> </ul>	<ul style="list-style-type: none"> <li>Univision</li> <li>Pixar</li> <li>Nickelodeon</li> <li>Disney</li> <li>Microsoft</li> <li>Alienware</li> </ul>
Mobile Application Development	<ul style="list-style-type: none"> <li>MDC School of Engineering + Technology (EnTech)</li> </ul>	<ul style="list-style-type: none"> <li>Digital Agency Network</li> <li>The Beacon Council</li> </ul>	<ul style="list-style-type: none"> <li>DAS Group</li> <li>Rank Media</li> <li>Crea7ive Media Agency</li> <li>Zakkour Technology Group</li> </ul>
<b>Barbara Goleman Senior High School</b>			
<b>Magnet</b>	<b>Educational</b>	<b>Community</b>	<b>Business</b>
Innovative Enterprise Technologies   Information System Technologies	<ul style="list-style-type: none"> <li>MDC’s EnTech</li> </ul>	<ul style="list-style-type: none"> <li>Knight Foundation</li> <li>The Beacon Council</li> </ul>	<ul style="list-style-type: none"> <li>Terremark</li> <li>Cisco Systems</li> <li>SAP Systems</li> <li>Hilton International</li> </ul>
Innovative Enterprise Technologies   Digital Marketing	<ul style="list-style-type: none"> <li>MDC’s School of Communication</li> <li>FIU’s School of Communication</li> </ul>	<ul style="list-style-type: none"> <li>Knight Foundation</li> <li>The Beacon Council</li> </ul>	<ul style="list-style-type: none"> <li>The Miami Herald</li> <li>Univision</li> <li>NBC Studios</li> <li>WSVN</li> <li>Fox News</li> </ul>
Innovative Enterprise Technologies   FinTech	<ul style="list-style-type: none"> <li>MDC’s EnTech</li> <li>MDC’s School of Business</li> <li>FIU’s School of Business</li> </ul>	<ul style="list-style-type: none"> <li>The Beacon Council (Representing over 27 different industries including Business Development and Information Technology)</li> </ul>	<ul style="list-style-type: none"> <li>Baptist Health of South Florida</li> <li>South Florida Federal Credit Union</li> <li>M-DCPS Information Technology Services</li> <li>SAP Systems</li> <li>Visa International</li> </ul>

Barbara Goleman Senior High School			
Magnet	Educational	Community	Business
National Security Intelligence   Forensic Science	<ul style="list-style-type: none"> <li>● MDC’s School of Justice</li> <li>● City of Miami Police Academy</li> <li>● FIU Forensic Institute</li> </ul>	<ul style="list-style-type: none"> <li>● Fraternal Order of Police</li> <li>● Florida Division of the International Association for Identification</li> </ul>	<ul style="list-style-type: none"> <li>● Miami-Dade County’s Coroner’s Office</li> <li>● Miami-Dade County Police Department</li> <li>● Miami-Dade County Schools Police Department</li> </ul>
National Security Intelligence   Law Enforcement/Intelligence Studies	<ul style="list-style-type: none"> <li>● MDC’s School of Justice</li> <li>● City of Miami Police Academy</li> </ul>	<ul style="list-style-type: none"> <li>● Fraternal Order of Police</li> <li>● Phi Beta Cyber Society</li> </ul>	<ul style="list-style-type: none"> <li>● Miami-Dade County’s Coroner’s Office</li> <li>● Miami-Dade County Police Department</li> <li>● Miami-Dade County Schools Police Department</li> <li>● Department of Homeland Security</li> </ul>
National Security Intelligence   Cybersecurity	<ul style="list-style-type: none"> <li>● MDC’s School of Justice</li> <li>● City of Miami Police Academy</li> </ul>	<ul style="list-style-type: none"> <li>● Fraternal Order of Police</li> <li>● Phi Beta Cyber Society</li> </ul>	<ul style="list-style-type: none"> <li>● Miami-Dade County’s Coroner’s Office</li> <li>● Miami-Dade County Police Department</li> <li>● Miami-Dade County Schools Police Department</li> <li>● Federal Bureau of Investigations</li> </ul>
STEM Advanced Placement Capstone	<ul style="list-style-type: none"> <li>● MDC’s School of Science</li> <li>● MDC’s EnTech</li> <li>● FIU’s College of Arts, Science &amp; Education</li> </ul>	<ul style="list-style-type: none"> <li>● Knight Foundation</li> <li>● The Beacon Council</li> </ul>	<ul style="list-style-type: none"> <li>● The College Board</li> </ul>

**QUALITY OF PERSONNEL***The qualifications of the personnel the applicant plans to use on the project.***A. Project Director Qualifications**

**Dr. Robert D. Strickland, Project Director**, currently serves as the Administrative Director of the School Choice and Parental Options (SCPO) office and is responsible for the development, implementation, marketing, and monitoring of over 380 magnet programs offered in 114 schools within the District and for directing staff assigned to the development and implementation of the Magnet Schools Assistance Program (MSAP) grant within Miami-Dade County Public Schools (MDCPS). Prior to joining SCPO, Dr. Strickland was Administrative Director in the District's Office of Professional Development and Educational Services, and was responsible for providing professional development to instructional personnel in fragile schools through the Student Teacher Support Team (ST2) model, a variation of a Response to Intervention (RtI) approach. He was also responsible for developing an online district-wide service log to track the operational services of professional and curriculum development provided to each individual school site and teacher. His 31 years of diverse educational and leadership experience make him an excellent choice for Project Director of MSAP Magnet Programs, as he has proven through the success of previous MSAP grant-supported programs. Dr. Strickland has been instrumental in restructuring the online magnet application process, and for facilitating a district target marketing system to assist in meeting the goal of reducing minority isolation and in developing the School Targeted Assistive System (STARS) tool for reporting school-site targeted recruitment plans. Under

his leadership, public interest in choice offerings has steadily increased from approximately 34,000 in 2008, to over 82,000 in 2017. Currently, there are approximately 69,700 students enrolled in magnet programs, which represents 19.6% of the District's student membership. Additionally, the quality of magnet programs has also increased under his leadership; over the past six years M-DCPS Magnet schools lead the nation in Magnet Schools of America awards with 194 Magnet Merit Awards including 42 merit recognitions for 2017. Through his extensive experience, Dr. Strickland will ensure the project is completed on time and within budget, and will provide general oversight, support, and assistance to the *STEM Pathways Project* team to guarantee program success.

### **B. Key Personnel Qualifications**

**Ms. Susan O'Connor, Project Coordinator of Curriculum**, has over 40 years of educational experience in the District and 15 years in magnet education. As a key grant developer, Ms. O'Connor was instrumental in building partnerships with District staff, Zoo Miami, the Zoological Society of Florida, Discovery Education, and Fairchild Tropical Botanic Gardens. As a former Educational Specialist for Charter School Operations, her responsibilities included maintaining technology resources for 77 Charter Schools monitored by the District; collaborating with school principals and staff to coordinate professional development; monitoring curriculum and compliance; administering the Charter Schools' compliance management software; and managing data and reports. As an environmental science magnet lead teacher, Ms. O'Connor directed the school's *iChoose* project, funded by a grant from the Voluntary Public School Choice program, where she was instrumental in recruiting students to

prevent minority group isolation. As Project Coordinator of Curriculum for the *STEM Pathways Project*, Ms. O'Connor will work closely with the proposed schools to direct the day-to-day curricular operations. Her duties will include to facilitate the development and implementation of magnet theme curricula; guide professional development design and delivery; assist with the design and realization of the school marketing plan and materials; lead student recruitment efforts to prevent minority group isolation; facilitate magnet events and workshops; organize and analyze student achievement data; and create reports to identify individual student needs.

**Ms. LaShawn Kinder, Project Coordinator of Operations**, currently serves in the Office of School Choice and Parental Options (SCPO) for Miami-Dade County Public Schools as the Project Coordinator for a federal grant that is ending. Prior to joining SCPO, Ms. Kinder worked in the Office of Professional Development where she conducted trainings for teachers and school site administrators. Additionally, in her role as a PD Specialist, she assisted school sites with the restructuring of curriculum and programs to affect learning and increase student achievement on standardized state-wide testing. Ms. Kinder began her career with M-DCPS as a classroom teacher, and quickly emerged as a leader in education in her roles as Department Chair, Reading Coach, Virtual School Facilitator, and Testing Coordinator. Although Ms. Kinder is dedicated to her on-going work at the District level, she continues to affect students in the classroom as an adjunct professor and portfolio reviewer for Miami Dade College in the School of Education. Ms. Kinder's 15 years of experience in varied capacities make her a valuable asset to the *STEM Pathways Project* where she will serve as Project Coordinator of Operations. In this capacity, Ms. Kinder will manage the day-to-day program

operations; oversee non-personnel expenditures; direct installation of the highly technical theme-based labs; assist with the design of school marketing plans and materials; recruit students to prevent minority group isolation; collect data for reports; meet with principals to coordinate professional development; assist school sites in creating sustainable partnerships; and develop as well as write contracts to secure services from grant partners.

**Ms. Ana Amador, Budget Analyst Supervisor**, currently handles all federal grant funds and audits the schools' Cliff/Grant Availability Reports to assure financial fidelity of grant funds. Additionally, Ms. Amador processes, and provides assistance to school personnel in processing travel and purchase orders. She assists with completing annual performance reports, and annual evaluation reports, as required by the U.S. Department of Education. As a Budget Analyst for over 11 years for the District, Ms. Amador is also responsible for the development, examination, and interpretation of the budget for numerous operational functions and programs. She analyzes, classifies, and interprets all applicable budget data in preparation of budget calculations, and consequently monitors and executes procedures for budget control. Applying her expertise, Ms. Amador will monitor all aspects of the *STEM Pathways Project* schools' budgets.

**Mr. Marcus Ortega, Director of Community Outreach (*In-Kind*)**, has oversight of all marketing, design, printing, branding, and social media promotions staff for the School Choice and Parental Options office (SCPO) for Miami-Dade County Public Schools. Mr. Ortega is responsible for activities essential to the brand development of the marketing and recruitment plan designed to prevent minority isolation. Mr. Ortega has a Bachelor of Fine Arts degree in Graphic and Interactive Communications from Ringling School of Art and

Design; a Master of Fine Arts in Computer Art from Savannah College of Art and Design; and graphic design experience with several advertising agencies. He has advanced knowledge of art direction and management in his field, and has developed his expertise in marketing and branding for over 19 years. As Director of Community Outreach for the *STEM Pathways Project*, Mr. Ortega will provide oversight of the execution of all facets of the District's marketing and recruiting plan related to the *STEM Pathways Project*.

**Mr. Alejandro Morales, Print and Design Production Supervisor (.50 In-Kind)**, is the marketing specialist in the SCPO office responsible for school recruitment materials to assist Magnet schools in attaining diversity in targeted neighborhoods through print material, support signage, social media, and public advertisements. He works closely with approved vendors to ensure fiscal responsibility and high quality products. As the resident interactive media designer of social media campaigns, Mr. Morales promotes Magnet choice through various web-based channels such as Twitter, Facebook, and Instagram. His goal for each Magnet program is to have a unified, clear, and accurate message that can be communicated in various languages to diverse audiences. Mr. Morales, who brings expertise of over 26 years of corporate marketing to M•DCPS, uses similar methods applied to prestigious corporate brands to successfully brand magnet programs. He will be responsible for print and web-based production of quality recruitment materials to promote a diverse student population in the *STEM Pathways Project*.

**Mr. Jayme Lam, Application Services Supervisor (.50 In-Kind)**, is responsible for database management including data collection and analysis; configuration and management

of the online magnet application software and lottery selection system; transportation logistics; and balanced recruitment efforts to targeted communities. He is also responsible for designing, implementing, and maintaining the District's Magnet schools website. Mr. Lam's efforts ensure equity in the Magnet selection process, provide valuable data, and help in maintaining effective community outreach and dissemination of information regarding Magnet programs. Mr. Lam's 12 years of experience in web design and support for technology systems make him invaluable to ensuring equitable access to the *STEM Pathways Project*.

**Ms. Gloria Simmons, Business and Community Partnership Facilitator**, served as the initial Executive Director of M-DCPS' Office of Civil Rights and Diversity Compliance, and as a member of the Bi•Racial Tri•Ethnic Committee, advisor to the Honorable C. Clyde Atkins regarding the District's compliance with the Court's plan for the desegregation of Dade County Public Schools. During her tenure as executive director, she assisted the School Board Attorney and consulting attorneys in proving the District's unitary status, establishing the Office of Diversity Compliance, revising relevant School Board Policies, monitoring the District's Post Unitary Plan of Action, preparing the Superintendent's Florida Educational Equity Update to the Florida Department of Education and providing curriculum staff support to the Diversity Equity and Excellence Advisory Committee. She served as the post•unitary status advisor to The School Board of Miami•Dade County. Ms. Simmons will serve as a liaison between M•DCPS and community partners, business, and government agencies for the *STEM Pathways Project*.

**PRINCIPALS:** All three *STEM Pathway Project* principals will provide oversight of

the planning, organizing, and administration of all activities and functions that are essential to the operation of an effective and efficient instructional environment that offers maximum opportunity for student growth. The principals of each school will ensure that the magnet curriculum is delivered with fidelity, meet the project's desegregation and student achievement objectives, monitor the success of all project activities, develop community partnerships, facilitate professional development, and identify funding opportunities in order to sustain the magnet program at the high-performance level when the MSAP funding ends.

**Ms. Crystal C. Coffey, Principal: Pine Lake Elementary School (*In-Kind*)**, is an innovative and imaginative instructional leader with an educational history that spans 33 years in the M•DCPS system. Ms. Coffey had oversight of the 21<sup>st</sup> Century Grant in 2009. She has a Master of Science degree in Elementary Education, and a Bachelor of Arts degree in Elementary Education. She has ten years of experience as an elementary school principal; ten years of experience as an assistant principal; nine years of experience as a middle school teacher; and three years as a primary grade teacher.

**Mr. Joaquin P. Hernandez, Principal: Barbara Goleman Senior High School (*In-Kind*)**, is a qualified educator who began his teaching career in 1980 as an Assistant Professor at the International Fine Arts College. He has four years of experience as a middle school mathematics teacher and department chairperson, 11 years of experience as a middle school assistant principal, five years of experience as a middle school principal, and six years of experience as a senior high school principal. Mr. Hernandez has a Master of Science degree in Educational Leadership, and a Bachelor of Science degree in Psychology. He sits on the

College Board Higher Education Advisory Board, and has received the Miami Lakes Optimist Club Appreciation Award, and the Town of Miami Lakes Distinguished Citizen Award for recognition of his work and dedication towards the enrichment of the Town of Miami Lakes.

**Mr. Humberto J. Miret, Principal: Miami Southridge Senior High School (*In-Kind*)**, is a dedicated educational leader who was appointed by the M•DCPS Board as the administrative leader of Miami Southridge Senior High School in 2015. He has a Master of Science degree in Educational Leadership, and a Bachelor of Science degree with a dual major in Health and Physical Education. In 2009, Mr. Miret was awarded the South Central Regional Center Finalist for Assistant Principal of the Year. His leadership experience is backed by four years of service as a middle school principal; six years as an assistant principal; and one year as an administrative assistant. Prior to his administrative leadership service, Mr. Miret was a senior high school teacher for ten years in the M•DCPS system. He has been an effective well-qualified educator for 22 years.

### **C. Teacher Qualifications**

**Lead Teachers** will coordinate and provide leadership to successfully implement the *STEM Pathways Project*. There will be one lead teacher in each school. The lead teacher's responsibilities will include coordinating the daily organizational operation of the magnet school program and maintaining all school based records required for reporting. The lead teacher will also assist the principal with implementing the magnet theme and the unique magnet curricula, as well as identifying appropriate personnel qualified to teach the distinctive magnet programs; coordinating community resources related to the magnet school

program; marketing the magnet program; and recruiting students to prevent minority group isolation.

## QUALIFICATION REQUIREMENTS

***Pine Lake Elementary School:*** Valid Florida Teaching Certificate in Biology; Master’s Degree preferred; knowledge in the area of Science, Biology, Zoology or Botany, and experience with curriculum development and design. Expertise and knowledge of working in diverse environments with elementary age students from different social, economic, ethnic, and racial backgrounds.

***Miami Southridge Senior High School:*** Valid Florida Teaching Certificate, Master’s Degree preferred; experience in Digital Design/Digital Art, Technology or Business and experience and with curriculum development and design. Knowledge of working in diverse environments with high school students from different social, economic, ethnic, and racial backgrounds.

***Barbara Goleman Senior High School:*** Valid Florida Teaching Certificate, Master’s Degree preferred; experience in Information Technology and experience with curriculum development and design. Knowledge of working in diverse environments with students from different social, economic, ethnic, and racial backgrounds.

**Magnet-Theme Content Teachers** will implement the highly specialized magnet theme curricula at the selected Project schools. They will be selected on the basis of their

expertise in specific subject areas, knowledge of the community and target areas, interest in specialized and innovative curriculum, and experience with a diverse student population.

### QUALIFICATION REQUIREMENTS

***Pine Lake Elementary School:*** Valid Florida Teaching Certificate in Biology; knowledge and expertise in Biological Science. Knowledge of working in diverse environments with students from different social, economic, ethnic, and racial backgrounds.

***Miami Southridge Senior High School:***

***Magnet-Theme Content Teachers:*** Valid Florida Teaching Certificate; knowledge of working in diverse environments with students from different social, economic, ethnic, and racial backgrounds; and:

- ***Teacher 1:*** Knowledge of Digital Design/Digital Art specifically in gaming and animation.
- ***Teacher 2:*** Knowledge of Business Systems, specifically in app development.
- ***Teacher 3:*** Knowledge of Information Technology specifically in hardware/software platforms, coding and programming.
- ***Teacher 4:*** Knowledge in Information Technology Systems.

***Barbara Goleman Senior High School:***

***Magnet-Theme Content Teachers:*** Valid Florida Teaching Certificate; knowledge of working in diverse environments with students from different social, economic, ethnic, and racial backgrounds; and:

- ***Teacher 1:*** Knowledge of Business, specifically in Enterprise Resource Planning (ERP) software
- ***Teacher 2:*** Knowledge of Information Technology specifically in Homeland and Cyber Security

***Teacher 3:*** Knowledge of Information Technology Systems.

#### **D. External Evaluator Qualifications**

**Q-Q Research Consultants (QQRC), External Evaluator,** is a consulting firm with a solid track record in conducting all phases of research and program evaluation. The team is comprised of a diverse group of professionals with advanced academic training in quantitative and qualitative methodologies, committed to utilizing “best practice” and rigorous research methodologies. QQRC has undertaken research and evaluation projects for many federally-funded projects, including seven current projects funded by the Department of Education. Lead evaluation staff are listed below.

**Sandra Williams, Ph.D., Lead Evaluation Consultant,** is CEO of QQRC, the only minority and women-owned research and evaluation firm in South Florida. Dr. Williams

received her master's degree in Developmental Psychology from Columbia University and her doctorate in Developmental Psychology from Florida International University. She serves as the Lead Evaluator on a number of federally funded programs and has expertise in conducting random assignment and quasi- experimental design program evaluation studies having worked in a number of settings including clinical, community, academia, and government. She has led and monitored over 100 evaluation projects in which she provided monitoring reports and coaching to bring about program improvement.

**Kristin Nichols-Lopez, Ph.D., Lead Evaluation Consultant**, has 15 years of experience in research and evaluation in the areas psychology and education (K-12 and postsecondary). She received a Master's degree in Counseling Psychology and Doctorate in Developmental Psychology, both from Florida International University. She was Director of Evaluation at the fourth largest school District in the U.S., and has overseen evaluation activities for a diverse range of federally funded education programs ranging from Title I service programs, to grants involving school choice funded by the Office of Innovation and Improvement, to programs aimed at improving achievement in populations of English language. She is skilled in study design and survey development and has an extensive background in quantitative research procedures and methodology. She is also skilled in statistical analyses including ANOVA, regression, growth modeling, SEM, HLM, propensity score matching and other complex multivariate statistical methods.

\*Resumes for above mentioned personnel, as well as other support personnel may be found in the Appendix

**QUALITY OF PROJECT EVALUATION**

*1) The extent to which the methods of evaluation will, if well-implemented, produce evidence of promise.*

Evaluation of the *STEM Pathways Project* will examine the nature and impact of the school choice program that will be implemented within the three new STEM choice schools, Pine Lake Elementary, Miami Southridge Senior, and Barbara Goleman Senior, and monitor attainment of the project's performance measures delineated previously in the Quality of Management plan.

The evaluation will be conducted over the five-year grant period by an external evaluator, Q-Q Research Consultants (QQR), that was selected through a formal bid solicitation process. The use of an external evaluator serves to provide an unbiased, objective view of program evaluation, which is essential for determining a program's effectiveness. QQR staff worked closely with the District to prepare the following evaluation plan. In addition, QQR will work with key project personnel to obtain the required data, and collaborate with project staff to develop all rubrics used to assess attainment of the performance measures.

QQR is well-suited to serve as the evaluator for the MSAP program. First, QQR has served as the evaluator for the District's previous MSAP grant for funding years 2015 through 2017. Second, QQR has served as the lead evaluator for over 50 federally funded projects. QQR employs a team of seasoned evaluators with extensive expertise in evaluating programs and initiatives. QQR's CEO, Dr. Sandra Williams serves as lead evaluator on all projects, and consultant Dr. Kristin Nichols-Lopez has served as lead

evaluator on several federally funded evaluations. The qualifications of both lead evaluators can be found in the Quality of Personnel section. As such, QQRC has a proven track record of carrying out the proposed evaluation activities. QQRC has expertise in qualitative and quantitative methods, data analysis, and in translating results into actionable recommendations. Lastly, QQRC brings diversity, cultural competence, and extensive experience to projects. Providing high quality, personalized services to clients, Q-Q Research has completed over 200 research and evaluation related client engagements in the U.S. and abroad.

The evaluation plan will utilize systematic assessment methods with multiple emphases using both annual formative and summative evaluation practices by means of a revised CIPP (Context, Input, Process, & Product) evaluation model (Stufflebeam & Zheng, 2017). According to Stufflebeam & Zheng (2017), context evaluation processes will assess necessities, difficulties, and opportunities, and aid project staff in assessing goals and objectives within a defined context, while input evaluation processes assess strategy and implementation approaches, indicating areas in which project staff may improve upon strategy. Process evaluation activities involve the monitoring of progress in carrying out planned activities, allowing the project staff to maintain accountability records of their action plan. Product evaluation activities seek to identify both short-term and long term outcomes, whether intended or unintended, aiding project staff to determine if the needs of the various stakeholders are being met. Overall, the evaluation model proposed in this plan allows for the use of informed, data-driven decision making to assess program performance and efficacy.

As suggested by this evaluation model, both formative and summative reports will be

provided. Formative evaluation reports will provide periodic, interim overviews of the program’s performance and will aid project staff in determining if any amendments to program’s existing protocol are warranted. In addition, a summative evaluation report will include findings on data amassed over the course of the project and will include, but is not limited to an executive summary; an introduction to the project; methodology and approach; results of data analyses; and recommendations for programmatic components. The methodology used for the evaluation will combine accepted practice in educational evaluation, using both quantitative and qualitative methods employing the use of both objectives and performance measures that assess program impact, that if well implemented, will produce evidence of promise.

*The evaluation will be grounded in the five primary objectives of the M-DCPS STEM*

**1. Was the *STEM Pathways Project* initiative implemented as planned?**

- a. Has district support staff succeeded in providing adequate support and professional development?
- b. Was the proposed curriculum successfully delivered?
- c. Were the proposed partnerships successful? Did students participate in STEM activities with community partners?

- a. Did the percentage of ethnic/racial minority students enrolling in advanced STEM coursework more closely reflect the district averages of ethnic/minority enrollment?
- b. Did the percentage of economically disadvantaged students enrolling in advanced STEM coursework more closely reflect the district averages of economically disadvantaged enrollment?
- c. Did students engage in increased interaction in classroom activities with students from different ethnic/racial and/or economic backgrounds?

### **3. Did the quality of teaching of STEM curriculum improve at schools implementing**

- a. Did the teachers participate in the planned professional development (PD)?
- b. Were the proposed partnerships successful? Did teachers participate in STEM PD activities with community partners?
- c. Did teachers successfully integrate evidence-based practices in STEM instruction into the classroom by developing and implementing unit/lesson plans that reflect the instructional theme of their schools?

- a. Did the percentage of students achieving proficiency on state assessments of English/language arts, mathematics and science improve annually in *STEM Pathways Project* schools (disaggregated by subgroup)?
- b. Did students participating in the *STEM Pathways Project* perform significantly better on state assessments of English/language arts, mathematics and science than comparison students?

In order to address the primary evaluation questions, the evaluation will draw data from multiple sources including: (a) project logs/schedules; (b) rosters; (c) proposed budgets and expense records; (d) surveys of students and teachers; (e) interviews of stakeholders; (f) focus groups, (g) classroom observations, and (i) archival data maintained by the M-DCPS Student Database System, including student demographics and achievement indicators.

Surveys will be administered to both students and teachers in order to measure various outcomes. Student surveys will be created to assess the impact of the *STEM Pathways Project* on minority and socio-economic group isolation. Teacher surveys will be created in order to ascertain the overall impact of professional development, and to measure minority and socio-economic group isolation. Interviews of principals, teachers, district administrators, classroom observations and focus groups will be conducted in order to gain an understanding of the implementation fidelity and program efficacy. More specifically, questions will be asked regarding teacher selection and development, professional

development, curriculum development, and student achievement. Classroom observations will be conducted to evaluate teacher effectiveness and curriculum implementation.

Finally, improved student achievement is the ultimate goal of the *STEM Pathways Project*. As such, the impact of the project on student achievement in as measured by scores on state assessments of English/language arts, mathematics and science will be examined and comparisons will be made to an appropriate comparison group using a quasi-experimental design. The evaluation is designed to produce evidence of What Works Clearinghouse Study Review Standards to *Meet Evidence Standards with Reservations* for a quasi-experimental study design. The evaluation will compare the outcomes of students who participated in *STEM Pathways Project* (treatment group) with the performance of selected control students enrolled in the same year in the same grades in non-magnet public schools in the district (comparison group). To ensure that this evaluation design will result in findings that meet What Works Clearinghouse Study Review Standards *with Reservations*, this evaluation will: 1) establish distinct comparison schools; 2) ensure baseline equivalence and 3) control the influence of confounding factors that may influence the outcome for only one group. Quasi-experimental designs do not employ random assignment as assignment to conditions (treatment versus comparison) is by means of selection (in which participants or others choose a treatment for themselves). Instead, quasi-experimental designs employ the use of a comparison group that approximates the treatment group as closely as possible as determined by baseline individual participant characteristics. Thus, the comparison group is thought to be an adequate representation of what would have been the outcomes if the project had not been

implemented (i.e., the counterfactual). Such a design meets the qualifications of the “What Works Clearinghouse Evidence Standards with reservations”, and if well implemented, would provide “empirical evidence to support the theoretical linkage(s) between at least one critical component and at least one relevant outcome presented in the logic model for the proposed process, product, strategy, or practice” meeting the qualifications of *evidence of promise* as defined in the notice inviting applications for the Magnet School Assistance Program for fiscal year 2017.

On an annual basis, progress reports will be submitted according to the timeline established by the grantor. Formative reports will be provided annually by the evaluator to the program staff. Following the completion of the grant, a comprehensive, end-of-project summative report including an impact achievement analysis of evaluation findings will be provided. This schedule will ensure the timely collection of data and dissemination of information needed to guide ongoing improvement.

Evaluation—both formative and summative— of the effectiveness of this *STEM Pathways Project* learning model will advance current theory, knowledge and practice with reference to content, structure and efficacy, with particular attention to minority and socioeconomically disadvantaged students. The evaluation and the lessons learned will further drive the improvement process and indicate the most effective methods for scaling the model to other schools.

**Design.** A mixed-method design will be used to evaluate program impact by answering the evaluation questions listed above. Descriptive and qualitative methods will be used to examine program implementation and partnership success, impact on reducing minority and

socioeconomic isolation, effectiveness of teacher professional development, and impact on student achievement. In addition, impact on student achievement will also be evaluated using quasi-experimental control group design comparing the performance of students who participated in *STEM Pathways Project* (treatment group) with the performance of selected control students enrolled in the same year in the same grades in non-magnet public schools in the district (comparison group). The selection process for students in the control groups is described below.

**Data Analyses.** Descriptive and inferential analyses will be utilized to examine all survey items. For example, measures of central tendency will be computed for survey items to determine students' interest and engagement. Focus group data, observations, and interview data will be analyzed using qualitative analytic strategies.

**Quasi-experimental design and impact analysis.** To evaluate the impact of the program on student achievement, comparison students will be selected from the pool of students attending non-magnet schools located within a reasonable proximity to the target school who are matched to program students on several observable demographic characteristics and prior academic achievement. The bias of concern in quasi-experimental design is referred to as “selection bias”, or the chance that any differences in the outcome variable of interest between the treatment and control groups might be due to selection characteristics rather than the programmatic intervention. In the case of a program involving school choice like the *STEM Pathways Project*, families of students who choose to attend a magnet school may be markedly different from the families of those who do not. When examining an outcome like student academic achievement, if selection bias is

operating, it may be that any differences observed in test scores are really due to variations in family or student characteristics rather than the impact of the magnet program. A quasi-experimental control group design can significantly reduce the number of confounds that may be present due to selection bias by matching intervention students to control students on several relevant variables. By matching treatment and control group students on demographics and prior achievement, we can expect some of the selection bias to be eliminated. Including prior achievement scores in the matching model is essential as prior achievement can serve as a proxy for several unobserved variables thought to influence achievement.

**Selection of Students.** For the treatment group, students enrolled in the three magnet schools participating the *STEM Pathways Project* for which valid assessment data are available will be considered in the achievement analysis. Evaluators will consult with program staff to determine other inclusionary criteria as applicable.

The selection of students to create a valid control group will be completed using a propensity score matching (PSM) technique. PSM is considered a best-practice in quasi experimental design (Stuart and Rubin, 2007). In PSM, each student is not matched on each observable variable entered into the matching model, but rather on a statistic called a propensity score. In lay terms, a propensity score estimates the likelihood that an individual would participate in the program (predicted likelihood of participation) given their observable characteristics. To this effect, PSM guarantees that the average characteristics of the treatment and comparison groups are similar, which is deemed satisfactory to attain an unbiased impact estimate and is thought to be sufficient to reduce

selection bias (Stuart and Rubin, 2007). The PSM matching model will include the following observed variables: student grade, demographics, participation in free and reduced-price lunch, ESE status, ELL designations, and achievement on available state reading and mathematics tests in the prior year.

For each year, datasets including prior year achievement scores will be matched without replacement with each dataset randomly sorted prior to matching to control for any ordering effect that might have existed. For each matched sample, independent sample t-tests will be conducted across groups to ensure that there are no group differences on the variables used in the matching process. Samples will be created annually to examine student achievement for each cohort participating in the program. The matching will be conducted using Multivariate and Propensity Score Matching Software with Automated Balance Optimization (Sekhon, 2009) in R version 3.1.1 (R Development Core Team, 2014).

**Achievement Outcome Measures.** The program schools served in the *STEM Pathways Project* include an elementary school (Pine Lake) serving grades K-5 and two high schools (Barbara Goleman Senior and Miami Southridge Senior) serving grades 9 through 12. In Florida, students are tested annually using the following assessments that are relevant to program objectives: the Florida Standards Assessments (FSA) in English Language Arts (ELA), Mathematics, end-of-course (EOC) subjects (Algebra 1, Algebra 2, and Geometry), the Next Generation Sunshine State Standards (NGSSS) Statewide Science Assessments, and the EOC Assessments in Biology I. Impact on student achievement in ELA, mathematics, and science will be measured each year and analyses

will be conducted annually beginning in year 2 of the project. For each of the students in the treatment group and the control group for which scores are available in a given year, standardized achievement scale scores will be obtained by grade and subject will be used as the outcome measure. As baseline measures of achievement are needed for matching purposes, analyses will begin with students enrolled in grade 4. Available standardized achievement scale scores for ELA, mathematics, and science for students in the treatment group will be compared to scores of students in the matched control group using a series of regression analyses annually. If the magnet students produce standardized achievement scale scores that are statistically significantly higher than those of control students, we would be able to conclude that the *STEM Pathways Project* was effective in improving student achievement. Other possible achievement outcomes, including proficiency and gain scores may be examined, if possible.

Student achievement and demographic data will be provided to the external evaluators by the District's Office of Assessment, Research and Data analysis. For each student in the analyses, assessment data will be collected annually beginning in year 2. Regression techniques will be used to examine program effects and compare the academic achievement of magnet students to that of comparison students annually. Other comparisons may be examined depending upon the minimum detectable effect size given the sizes of the sample obtained. It is important to note that changes in testing policies by the District or the State of Florida could affect the data available and the evaluator's ability to conduct impact analyses as stated in the application. If any such events occur, the plan for impact analyses would be modified accordingly in order to work with

available data in a manner most consistent with acceptable standards.

### QUALITY OF PROJECT EVALUATION

2) *The extent to which the methods of evaluation include the use of objective performance measures that are clearly related to the intended outcomes of the project and will produce quantitative and qualitative data to the extent possible.*

QQRC has developed a comprehensive evaluation plan that includes the collection of both qualitative and quantitative data intended to monitor progress towards achieving the stated objectives throughout the length of the project. Both formative and summative evaluation techniques will be combined with an assortment of data collection and analysis strategies to achieve this end using a mixed-method design. A series of quantitative performance measures have been developed to monitor progress towards achieving the stated objectives throughout the length of the project. Two types of performance measures have been developed: process measures and outcome measures. Process measures focus on the *STEM Pathways Project* operations, implementation, and service delivery, while outcome measures focus on the effectiveness of the *STEM Pathways Project* and its outcomes. The decision was made to examine the various performance measures for each *STEM Pathways Project* school in order to more effectively monitor differences in implementation and success at each site. Each performance measure is aligned with a project objective and includes benchmarks that must be met annually. The performance measures are listed previously in the Quality of the Management Plan.

When applicable, performance measures were disaggregated by race/ethnicity and socio-economic status in order to examine the success of the project across different ethnic/racial

groups. In addition, data collection strategies will employ the use of site visits, classroom observations, interviews, and focus groups through which qualitative data will be collected and aligned with the quantitative measures to monitor progress towards achieving the stated objectives.

In order to assess program implementation and effectiveness, the external evaluators will implement a continuous evaluation process evaluating the project's progress towards meeting objectives and goals allowing for timely project modifications. The external evaluator will develop a standardized monitoring tool allowing for all necessary data to be captured for assessment of progress in achieving objectives. Several methods of data collection are being proposed to address the information requirements of a MSAP grant. Those include: (a) questionnaires, (b) focus groups, (c) interviews, (d) classrooms observations, (e) review of school records (e.g., enrollment, applications) and (f) review of district data (e.g., tests scores). Data will be collected directly from participants and from existing records at the participating schools and/or the school district. Data collection instruments will be aligned with project objectives and performance measures. These data collection instruments will be designed by the evaluator and revised and edited in collaboration with MSAP project management. Standardized sets of questions and observation rubrics will be developed by QQRC in collaboration with project management.

Enrollment data will be obtained and analyzed at each FTE period in October and February of each academic year. Achievement data will be disaggregated by ethnic/racial group and analyzed when results are made available by the state in the summer of each academic year. Teacher and student surveys will be developed to include items that relate to

specific objectives and performance measures. These surveys will be designed by the evaluator and revised and edited in collaboration with MSAP project management. Surveys will be conducted annually by April of each academic year and results will be shared with school and District staff as soon as they are available.

The evaluator will conduct onsite monitoring visits no less than three times each project year including an introductory meeting, review of the monitoring process, review of any relevant documents, assessment of implementation of project activities, classroom observations, and an exit meeting to discuss monitoring findings. Rubrics will be created for use in assessing the classroom environment and magnet curriculum/instruction. A site visitation template will be created to serve as a data collection tool for the assessment team when conducting site visits. Templates will also serve as outlines for the formative evaluation reports. Rubrics will also be created to review lessons plans for alignment with grant requirements. After each site visit, the evaluator will meet with both school and program staff to provide verbal feedback. A site-visit monitoring evaluation report will be completed after the first site visit and will be updated after each site visit to provide written formative feedback to both the school site and District administrators. These formative evaluation reports will provide periodic, interim overviews of the program's performance and will aid project staff in determining if any amendments to program's existing protocol are warranted. Meetings will be held with both school site and district staff to discuss findings.

On an annual basis, data will be collected and reported for each objective and individual performance measure and will be included in annual and final performance reports that will be submitted according to the timeline established by the grantor. Reports will be

submitted in the ED524B format using tables and charts as required by the USDOE (annual and ad hoc reports as well as the final performance report) and will include both quantitative and qualitative data as related to each benchmark. Formative reports will be provided annually by the evaluator to the program staff and will include annually updated data summaries that allow for the inspection of progress over time. Following the completion of the grant, a comprehensive, end-of-project summative report of evaluation findings will be provided. This schedule will ensure the timely collection of data and dissemination of information needed to guide ongoing improvement. Findings will be shared with school and district personnel.

The following section provides an overview of each objective and the strategies used to collect data regarding the performance measures aligned with each objective. Specific details on individual performance measures and annual targets can be found in the Quality of Management plan.

**OBJECTIVE 1.** Reduce minority and socioeconomic isolation in each STEM Pathways magnet.

**Evaluation.** Evaluators will review both magnet application and magnet enrollment data for the District, *STEM Pathways Project* schools, disaggregated by race/ethnicity, and review these data with project staff at each FTE period to identify areas needing improvement, if any. Evaluators will develop both teacher and student surveys and will conduct focus groups in each *STEM Pathways* school. Survey and focus groups questions will ask participants about the extent of interaction with students from various economic and racial/ethnic backgrounds. At the high school level, both students and teachers will

provide information related to the reduction of minority group isolation directly through self-report. At the elementary school level, only teachers will provide this information as it may be challenging to ask elementary school students questions regarding increased interaction with students of different racial/ethnic and/or economic backgrounds. The quantitative and qualitative data obtained from these data sources will be reviewed by the evaluators and project staff during years two and three in order to identify areas in need of revision, if any. Participants for the focus groups will be selected by the evaluator and include participants from various economic and racial/ethnic backgrounds to ensure adequate representation. All instructional staff and students will be asked to complete questionnaires.

**OBJECTIVE 2.** Design and implement innovative magnet programs that incorporate the use of specific instructional strategies to increase student achievement and reduce socioeconomic and racial isolation.

**Evaluation.** Evaluators will review data indicating the duration and frequency of each magnet theme-related course, and class rosters for each of these courses, as well as the lessons provided to the project directors. Evaluators will utilize a rubric to review a random sample of completed unit/lesson plans to determine whether these materials reflect knowledge gained from professional development, and demonstrate alignment with State standards and each school's magnet theme(s). Evaluators will conduct site visits/classroom observations to review evidence that the standards-based lessons are being implemented. The evaluators will be provided with a list of teachers who have developed and are implementing standards-based, magnet-themed lessons. Classes taught by these teachers will be selected randomly and

observations made. Additionally, site visit observations will examine if the school's physical (e.g., school hallways) and classroom environments reflect the STEM theme (e.g., the presence and use of information about STEM-related careers; displays of the scope and sequence of the STEM program; student STEM-related work; and the use of STEM-related equipment and supplies. During observations, and guided by a rubric, the evaluators will be looking for the delivery of STEM unit/lesson plans and student engagement in these lessons. They also will conduct interviews with the principal and key staff at each school, as well as focus groups with teachers and students during the years two and three. Qualitative data will be gathered and analyzed about the extent to which the STEM instructional theme is being implemented, challenges to the integration of the innovative instructional model and how these are being addressed, and methods by which each school is developing the capacity to continue the positive changes in teaching and learning beyond the grant. Evaluators will provide a summary of findings in formative site visit reports annually. Meetings will be held with project staff during years two and three in order to identify areas in need of revision, if any.

**OBJECTIVE 3.** Increase capacity of core and magnet themed teachers to deliver innovative theme-based curricula using specific instructional strategies and to promote cultural competency.

**Evaluation.** Teacher surveys will be created in order to ascertain the overall impact of professional development. Professional development calendars, sign-in sheets, and plans/presentations will be reviewed by external evaluators in coordination with District and program staff to ensure that teachers are participating in problem based learning development

activities. Interviews of principals, teachers, district administrators, classroom observations and focus groups will be conducted in order to gain an understanding of the program's objectives and activities and implementation efficacy. More specifically, questions will be asked regarding teacher selection and development, professional development, curriculum development, and student achievement. Classroom observations will be conducted to evaluate teacher effectiveness and curriculum implementation. Evaluators will review magnet theme-related, project-based learning unit/lesson plans in year two and three and conduct classroom observations, guided by a rubric, of a random number of classes to observe student participation in magnet theme-related, project-based learning activities.

**OBJECTIVE 4.** Increase percentage of magnet students, including those from major ethnic, racial and socioeconomic subgroups, who achieve learning gains on statewide assessments.

**Evaluation.** Students' scores on required state standardized tests in reading/language arts, mathematics and science will be disaggregated by ethnic/racial/socioeconomic subgroup and compared to baseline averages for each ethnic/racial and socio-demographic subgroup annually with increases expected each year. In addition, the percentage of students making learning gains on state standardized tests in reading/language arts, mathematics and science will be disaggregated by ethnic/racial and socio-demographic subgroup will be examined annually with increase expected each year. Currently, Florida administers The Florida Standards Assessments (FSA), which measure student success with the Florida Standards. The FSA includes assessments in English/language arts (grades 3-10), mathematics (grades 3-8), and End-of-Course (EOC) assessments for Algebra 1, Geometry, and Algebra 2. To assess proficiency in science, Florida administers the statewide science assessment which measures

student success with the Next Generation Sunshine State Standards and includes assessments in grades 5 and 8. At the middle and high school levels, Florida requires a computer-based EOC to measure student achievement of the specified standards for middle- and high-school level courses in science, specifically for Biology. Data describing the demographic characteristics and standardized test scores (FSA and EOC) attained by the students in the *STEM Pathways* schools will be obtained from the office of Assessment, Research and Data Analysis annually as they become available from the State. Frequencies and percentages of students making learning gains and/or scoring at proficiency on aforementioned assessments will be disaggregated by subgroup. In order to be make learning gains, students will need to satisfy one of the following criteria: a) A student may increase at least one achievement level on the statewide standardized assessment in the same subject area; b) A student may score below Achievement Level 3 on the statewide standardized assessment in the prior year and advance from one subcategory within Achievement Level 1 or 2 in the prior year to a higher subcategory in the current year in same subject area. Achievement Level 1 is comprised of three subcategories, and Achievement Level 2 is comprised of two subcategories; c) A student's score can remain at Achievement Level 3 or 4 on the statewide standardized assessment in the current year but the scale score must be greater in the current year than the prior year in the same subject area. d) A students may take a FSA EOC assessment and remain at Achievement Level 3 or Achievement Level 4, or e) A student may score at Achievement Level 5 in the prior year on the statewide standardized assessment and score in Achievement Level 5 in the current year in the same subject area. Intervention plans, calendars and intervention sign in sheets, as well as, products and related grades, rubrics, and

lesson plans for students' projects will be reviewed by the evaluators along with GPA data as specified by the timeline in the Quality of Management Plan.

**OBJECTIVE 5.** Ensure participation of all stakeholders (community members, parents, students, faculty, and project partners) in making decisions which affect instruction and the delivery of the project objectives.

**Evaluation.** Evaluators will review partnership outreach plans developed by each school. EESAC rosters will be examined to determine if membership includes appropriate community partners, parents, students and teachers. School improvement plans will be reviewed to ensure that the magnet theme and instructional strategies are incorporated. Meeting agendas, sign in sheets and minutes from parent support organizations, student government associations, and advisory boards will be reviewed to determine if participation of various stakeholders has occurred in alignment with the project's objectives.

### QUALITY OF PROJECT EVALUATION

*3) The extent to which the costs are reasonable in relation to the objectives, design, and potential significance of the proposed project.*

The evaluation plan for this project is budgeted under a fixed price agreement with QQRC, an evaluation firm that has a proven track record with the District on numerous projects and grants. Fixed price agreements are executed under the condition that the evaluator would complete the agreed upon plan and related evaluation work over the 5-year period of the grant. Typical program evaluation costs can range from 5% to 10% of the total grant. The

budgeted cost for the evaluation activities as proposed is \$68,000 annually. This represents less than 3% of the total project budget and is well within the acceptable range.

Under a fixed price agreement, the contract necessitates that the evaluator complete the stipulated work to the District’s satisfaction and no additional funds will be disbursed for evaluation costs other than the original agreed upon amount. The cost of the evaluation includes all payments the external evaluator who will provide all evaluation services in support of the project. The amount is inclusive of all time and expenses related to developing data collection methods, gathering, entering, analyzing, and reporting on data, involving personnel costs, travel, consultant services, project office expenses, etc. A list of proposed services is included below.

SERVICE	DESCRIPTION
Develop of evaluation plan	Q-Q Research will develop the evaluation plan including performance measures that will be tracked annually.
Client planning sessions	Planning sessions with the M-DCPS to establish and confirm project expectations and review the project work plan.
Produce project work plan	Develop a work plan to ensure all project related work aligns with the project goals and outcomes outlining all activities and estimated completion date.
Conduct literature reviews	Staff will obtain background knowledge on constructs of interest for each project in the form of a literature review of extant empirical work in the respective areas of interest.

<p>Customized Database &amp; Data Entry-Management</p>	<p>All sensitive data will be housed in password protected and encrypted databases and all those working with data will be under strict confidentiality agreements.</p>
<p>Data Collection and Management Overview</p>	<p>Q-Q Research will collect both quantitative and qualitative data. Quantitative data provided by MDCPS will be merged and prepared for analyses. Primary data will be collected at school sites and online (e.g. surveys). Qualitative data will be gathered from focus groups with students and interviews with teachers and/or administrators.</p>
<p>Data Collection Methods</p>	<p>Include: (a) questionnaires, (b) focus groups, (c) interviews, (d) classrooms observations, (e) review of school records (e.g., enrollment, applications) and (f) review of district data (e.g., tests scores). Data collection instruments will be aligned with project objectives and performance measures, designed by the evaluator and revised and edited in collaboration with project management.</p>
<p>Site Visits and Reports assessing implementation fidelity</p>	<p>Q-Q Research will conduct three site visit to all schools annually funded by the MSAP grant and will provide formative evaluation reports outlining findings and recommendations within two weeks following each site visit including recommendations for the school and program.</p>

<p>Classroom Observations/ Lesson plan reviews</p>	<p>Rubrics will be created for use in assessing the classroom environment and magnet curriculum/instruction. Rubrics will also be created to review lessons plans for alignment with grant requirements</p>
<p>Focus Groups and Interviews</p>	<p>Q-Q Research will conduct focus groups with students and interviews with teacher and/or administrators to obtain feedback regarding project implementation.</p>
<p>Surveys: development, data compilation and analysis</p>	<p>Questionnaires will be developed to include items that relate to specific objectives and performance measures. Surveys will be designed by the evaluator and revised in collaboration with project management and conducted annually.</p>
<p>Data Analyses</p>	<p>Descriptive and inferential statistical analysis will be conducted to evaluate the key research questions. Qualitative data will be analyzed using thematic coding, a data analytic strategy in which data are summarized and categorized to capture the important themes.</p>
<p>Quasi-Experimental Study Design to evaluate student achievement</p>	<p>Although less rigorous than randomized study design, a quasi-experimental design will be employed to compare the academic achievement of MSAP students to the achievement of a group of comparison students. Achievement measures</p>

	<p>(i.e., state-wide assessments) that would be appropriate for the goals of the project, as well as the grade levels served, will be selected in collaboration with MSAP project management.</p> <p>The design proposed for this evaluation will involve the selection and tracking of students attending non-magnet schools who are matched on all available observable characteristics, including prior academic achievement, student race/ethnicity, and socioeconomic status and other variables deemed to be appropriate. Propensity scores will be generated for potential comparison students and students from the comparison group will be matched to members of the intervention group using a matching procedure available in the statistical package R.</p>
<p>Tables and Narratives of Student Performance</p>	<p>Completion of tables and narratives will include tables summarizing annual performance on each performance measure by school, indicating whether the target was attained.</p> <p>These summaries are updated annually and used to review progress and help identify areas for improvement.</p>
<p>Summative evaluation reports</p>	<p>Summative evaluation reports will be produced on an annual basis and include progress on performance measures.</p> <p>Annually, reports will address each school individually and</p>

	results will be presented to MSAP directors. Reports will be submitted according to the requirements of the USDOE.
Final Evaluation Report	A final report provided at the conclusion of the project and examines long-term outcomes of the project to be shared with stakeholders and audiences.
Develop research based recommendations	Produce data driven recommendations based on evidence based practices, extant empirical and theoretical work in the respective area.
Present research and evaluation findings	Key staff will facilitate presentations for a variety of audiences in multiple settings.
<b>Budget TOTAL .....\$68,000</b>	

The selection of an external evaluator whose offices are located in South Florida, represents a logical choice to be able to contain and reduce evaluation costs, while still maintaining capacity for a thorough and complete evaluation plan. As a local firm, staff are afforded the experiential knowledge necessary for undertaking local projects with fidelity and competency. In addition, the selection of a local firm reduces travel costs for many evaluation related activities. Finally, the use of the District’s internal office of Assessment, Research, & Data Analysis (ARDA) to provide accurate student membership data and student achievement data to the project’s external evaluators represents further cost savings as related to data collection. The budgeted amount is inclusive of costs for evaluation personnel, fringes, equipment, materials, services, travel, as well as indirect costs to the external evaluation firm.

# Improving achievement through problem-based learning

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## Introduction

We live in a dynamic society in which social, political and technological conditions are changing continuously. So educators should analyse and evaluate the trends, in order to decide on appropriate curricula and methods of instruction which will make students ready for real life situations. Today, it is recognised that every person must be empowered to wonder, to suggest possible explanations, to propose ways to test personal or class hunches, to collect and interpret data obtained, to communicate the process and results to others (Yager, 2000). People who can think, solve problems, and make decisions based on evidence and reasoning are needed. Accordingly, today's science education must include providing students with a classroom environment where they experience the richness and excitement of knowing about and understanding the natural world, and where they use appropriate scientific processes and principles in making personal decisions. Problem-based learning (PBL), involving real or simulated problems, can produce the changes in knowledge, skills or attitudes necessary for making wise decisions on problems (Rangachari and Crankshaw, 1996). In PBL environments, students act as professionals and are confronted with problems that require clearly defining an ill-structured problem, developing hypotheses, accessing, analysing, utilising data from different sources, revising initial hypothesis as the data collected developing and justifying solutions based on evidence and reasoning (Gallagher *et al*, 1995; Barrows, 1986).

Ill-structured problems are those where there is no single right solution and as new information is gathered the

problem definition changes. So, a student in a problem-based classroom learns while dealing with ill-structured problems, and is responsible for seeking, accessing his or her own learning material, and developing skills to communicate acquired knowledge to other students and the teacher (Rosing, 1997). In fact, the study carried out by Krynock and Robb (1996) showed that PBL does increase higher-level thinking skills of eighth grade students by requiring them to think about a problem critically and analysing data to find the solution. Also, based on students' opinions, they reported that PBL students tend to work better in group and are able to do better research on a topic.

Moreover, Achilles and Hoover (1996) proposed that PBL was an effective model for addressing varied learning styles, improved general classroom behaviour and achievement, and made learning experiences more exciting at elementary and secondary grade levels. In addition, they suggested that this model encouraged life skills such as communication, mutual respect, teamwork, and responsibility. In addition, the results of the study carried out by McBroom and McBroom (2001) indicated that PBL enhanced secondary school students' knowledge level, attitude, and self-confidence. Gordon *et al*, (2001) found that PBL helped students develop interpersonal skills, critical thinking and information seeking.

To sum up, PBL as an instructional method appears to improve interpersonal skills, critical thinking, information seeking, communication, mutual respect and teamwork. Students involved in PBL tend to have more positive attitudes toward the course and better performance in tests. However, as reported by Dochy *et al*, (2003), the effects of the PBL are

moderated by the way the knowledge and skills are assessed, so this current study investigated the effect of problem-based learning on students' academic achievement and performance skills through multiple choice and an essay type exercise (which can be considered as an individualised version of the small group PBL activity).

Given the general lack of research on the comparative effect of problem-based and traditional approaches on high school students' learning, this paper addresses the research question: "Are there differences in the effectiveness of PBL and traditionally-designed biology instruction on tenth-grade students' academic achievement and performance skills in a unit on the human excretory system?"

## Method

### Subjects

Sixty-one 10<sup>th</sup>-grade students (n=39 boys and n=22 girls) in two complete classes instructed by the same biology teacher were involved in this study. The majority of the students were from middle to upper class families. Two instructional methods (PBL and traditionally-designed biology instruction) were randomly assigned to the classes as experimental and the control groups using the static-group comparison design (Fraenkel and Wallen, 1996). The number of students in the experimental group was 30 while that of in the control group was 31. The mean age of the students in both groups was 16.3 years. Previous biology grades of the students in both groups were comparable: 4.6 out of 5 in the experimental group and 4.7 out of 5 in the control group. Topics related to the excretory system were covered as part of the regular classroom curriculum in the biology course. During the four-week period, each group received an equal amount of instruction – four 40-minute periods.

### Instruments

#### *The Pre/Post Human Excretory System Achievement Test (HESAT)*

This was developed by the researchers by taking related literature into consideration. The test included 25 multiple-choice questions and one essay to measure students' academic achievement and performance skills respectively. All the items in the test were related to the structure and function of the excretory system and its relation to other organ systems. Multiple-choice questions required the students to recall definitions and facts as well as to integrate their knowledge of different topics in biology and other subject areas such as chemistry. The reliability of the multiple-choice part of the test was found to be 0.70. Sample items from the test are presented in the Appendix.

The essay, devised in line with the problem-based learning approach, aims at measuring students' performance skills such as the ability to: use relevant information in addressing the problem; articulate uncertainties; organise concepts; and interpret information. Each item in the Human Excretory System Achievement Test was examined by a group of experts in the field of science education, biological sciences and by biology teachers for content validity and format.

#### *Problem Based Learning Feedback Form*

This was adapted from the end-of-course evaluation form used by Mierson (1998). It consisted of two parts. In the first part, including 14 Likert-type items, students were asked to

respond to statements concerning PBL on a five-point scale. In the second part, including seven open-ended items, students were asked to give their opinions regarding PBL. This instrument was administered to students after the treatment to get their opinions about the PBL

### Treatment

The traditionally-designed biology instruction was based upon lessons employing lecture/questioning methods to teach concepts. Teaching strategies relied on teacher explanations, discussions and textbooks. Students were required to read the related section from the textbook before the class. The teacher structured the entire class as a unit, wrote notes on the chalkboard about the definition of concepts and drew figures of structures related to the excretory system. After the teacher's explanation, the concepts were discussed, directed by the teacher's questions. The majority of the time was devoted to instruction and discussions stemming from the teacher's explanation and questions. The remaining time was taken up with the worksheet study. The direction of communication in the classroom was from teacher to student.

### *The PBL Task*

In the experimental group, before the treatment five heterogeneous groups of six students were formed: these had different learning styles and academic performance and were of mixed gender composition. Then, students and the teacher were trained to use PBL.

During the treatment, students worked in small groups and dealt with ill-structured problems based upon patients' experiences. Every member of the group had some expected roles and responsibilities; students were supposed to participate actively in the group discussion. They had to express their ideas, feelings and share their knowledge and experience with each other. Each of them had to be sensitive to the needs and feelings of other group members. Apart from the group work, each student had to conduct an independent study and evaluate his/her learning at both individual and group levels. Students were asked to select their own learning issues and decide upon the appropriate depth for study.

Students also took specific roles which included the doctor, the patient, the reader, the reporter, and the presenter. For example, the reader read the pages distributed by the teacher, which provided increasing amounts of information about the patient's problem. The reporter wrote down the facts, ideas, hypotheses and learning issues identified by the group. The doctor interviewed the patient, asking the questions determined as a result of group discussion. During the interview, the patient answered the questions based on the information just provided to him/her about patients' medical history, history of current illness, socio-economic status, etc. The group then discussed the patient's problem, generated ideas, made predictions, identified learning issues and determined what further information was needed to better understand the problem – additional information such as physical exam results, laboratory test results was then given to the students. Each PBL session ended with both self-evaluation and a time in which groups evaluated their effort and made suggestions improving their performance.

Outside the classroom, students conducted independent study addressing the learning issues determined in the group session.

In the following session, the presenter (selected by

lottery from each group) summarised the previous session's work by describing relevant case data. In this way, the presenter provided a link between the two sessions. Students discussed their new knowledge and revised their previous ideas and hypotheses based on the new knowledge. These processes continued until the groups were satisfied that sufficient basic science was learned.

During the PBL sessions, the teacher organised the groups and created a comfortable atmosphere. The teacher ensured that students had control of the discussion. When guidance was needed, the teacher asked open-ended, very general questions and gave ample opportunity to students to focus on the goal. The teacher encouraged critical thinking. At the end of PBL implementation, students evaluated each other with respect to participation, preparation, interpersonal skills, and contribution to group progress. In this way, it was expected that students would become aware of the extent to which they behaved as intended - both individually and as a group. Students' learning was evaluated by using multiple choice and essay questions.

**Data analyses**

To test the null hypothesis – that there was no statistically significant, mean difference between students taught with PBL and those taught with traditionally-designed biology instruction with respect to a collective-dependent variable of academic achievement and performance skills – a Multivariate Analysis of Variance (MANOVA) was conducted. Students' academic achievement and performance skills were measured by multiple-choice questions and an essay respectively. Each multiple-choice item was given a numeric value of 1 if response was correct, and 0 if incorrect. Accordingly, scores ranged from 0 to 25. Students' essays were evaluated by two independent raters, using a rubric adapted from Lynch and Wolcott (2003). Students were rated according to four main performance skills, namely, identifying, exploring, prioritising and envisioning, on a scale from 1 to 5 (Table 1).

A rating of 1 corresponded to a weakness in all four performance skills. Those students approached the problem using very limited information (mainly facts and definition) and proceeded as if the goal was to find the single correct answer. A rating of 5 was given to students who were strong on all four performance skills. They showed complex awareness of ways to minimise uncertainties and proceeded on the basis that the goal was to strategically construct knowledge and to move toward better conclusions. Two independent raters evaluated the students' responses to the essay. Similarities and differences between the ratings of the two raters were discussed with the authors until a consensus was reached and a high inter-rater reliability obtained ( $r = 0.94$ ).

**Results**

Mean scores and Standard Deviations for both academic achievement (AA) and performance skills (PS) are given in Table 2.

At first sight, it appeared that students in the experimental and control groups had similar responses for those items requiring simple recall (*Mean* = 9.6 and *Mean* = 9.7 respectively). However, students in the experimental group could better integrate and organise the knowledge on different topics in biology and on different subjects such as chemistry (*Mean* = 9.6 and *Mean* = 11.4 respectively). For example, 100% of

**Table 1.** Rubric for essays

Score for skills performance skills	Criteria for scoring
1	presents the information but does not interpret; proceeds as if the purpose were to find a single, correct answer; does not provide any information or evidence that supports his/her claim about the problem.
2	uses evidence logically to support conclusions but jumps to conclusions as if the goal were to stack up evidence and information to support conclusions
3	organises knowledge; presents the problem in a coherent and balanced way; attempts to interpret the information and evaluates evidence from different viewpoints
4	approaches the problem as if the goal is to come to well-founded conclusions using evidence and principles and considering different viewpoints
5	uses a complex, coherent discussion of own perspective; proceeds as if the goal is to strategically construct knowledge, and to move toward better conclusions taking different aspects of the problem and different viewpoints into consideration.

the students in the experimental group and 96.6% of the students in the control group correctly answered a question which required them to remember the definition of tubular reabsorption as one of the basic renal processes. However, striking differences were apparent between the experimental and the control groups on the majority of items measuring ability to integrate and organise knowledge. For instance, the item asking students to combine their knowledge of the excretory system, circulatory system, endocrine system and homeostasis required them to identify the factor leading to an increase in urine volume. To answer this question, students had to understand the relationship between the blood volume, plasma osmotic pressure, and glomerular filtration rate. Moreover they had to recognise the role of antidiuretic hormone in the regulation of fluid balance in the body acting on tubular cells. They had to infer that a decrease in sodium reabsorption, ultimately, leads to a decrease in extra-cellular blood volume, increasing the volume of urine formation. About 48% of students in the control group responded to this item correctly, making the connections between their knowledge of different biological concepts. On the other hand, the percentage of students who answered this item correctly in the experimental group was 93.3, indicating that experimental group students were more successful in integrating knowledge.

Furthermore, students' responses in the essay revealed that students in the experimental group could better use relevant information in addressing the problems, interpret the information and use the principles to judge objectively. Here, a case based on a particular patient was given to students and they were asked to write a comprehensive essay in the light of questions about the patient's situation. Approximately 66%

**Table 2.** Statistics for AA and PS scores

	Control group		Experimental group	
	Mean	SD	Mean	SD
AA	17.75	2.43	21.03	1.81
PS	1.49	0.68	2.39	0.95

of students wrote their essays just listing the case information, and they ended their essays with one sentence indicating that patient was suffering from an illness related to excretory system. Only 23.3% of students in the experimental group approached the problem this way, though. There was only one student whose essay was scored 5 by one of the raters. This student was in the experimental group and approached the problem as if the goal was to move toward better conclusions, taking different aspects of the problem and different viewpoints into consideration.

In general, students' responses revealed that experimental group students could better identify what they knew and its relation to the patient's case. They were better at using, integrating and interpreting relevant information while proposing solutions. They could make better interpretations based on the evidence. Accordingly, they first outlined what they knew about the patient in their essays and, based on the patient's complaints and laboratory test results, they indicated that most probably there was something wrong with his kidneys. They supported their claim by providing information on kidney function. Then they tried to explain the symptoms in relation to possible consequences of kidney malfunction.

Prior to treatment, the Human Excretory System Achievement Test was administered to students in the experimental and the control groups to determine whether a statistically significant, mean difference existed between the two groups, with respect to previous academic achievement and performance skills. One-way Multivariate Analysis of Variance (MANOVA) results revealed that there was no statistically significant, mean difference between the two groups with respect to the collective dependent variables of previous academic achievement and performance skills, Wilks' Lambda = 0.99,  $F(2,53) = 1.11, p = 0.90$ .

After the treatment, the effect of PBL on students' academic achievement and performance skills was determined by conducting one-way MANOVA. The findings showed that there was a significant mean difference between the experimental and the control groups with respect to collective dependent variables of academic achievement and performance skills, Wilks' Lambda = 0.42,  $F(2,56) = 38.57, p = 0.00$ . The multivariate  $h^2$  based on Wilk's Lambda was strong, 0.58, implying that the magnitude of the difference between the groups was not small. In fact, this value indicated 58% of

multivariate variance of the dependent variables was associated with the treatment.

In order to determine the effect of the treatment on academic achievement and performance skills separately, univariate ANOVA's were run. The ANOVAs on the academic achievement scores and performance skills scores were significant –  $F(1,57) = 69.19, p = 0.000, h^2 = 0.55$  and  $F(1,57) = 18.75, p = 0.000, h^2 = 0.25$ , respectively – indicating that there was a statistically significant, mean difference between the groups with respect to these two variables. An inspection of the mean scores indicated that experimental group students performed better on the test in terms of academic achievement and performance skills (see Table 2).

### Student opinions on PBL

Students' responses to some of the items presented in problem-based learning feedback form are given in Table 3. It was found that students appreciated the value of PBL on their learning. Most of the students said that acquiring necessary skills and attitudes to access information and deciding on which resources to use, working cooperatively, and realising the practical applications of the knowledge contributed to their learning. Many students thought that they had a good understanding of basic principles and concepts and they could apply the general principles they had learned to other topics. Furthermore, students indicated that they did out-of-class searches, and tried to learn more about the topics because they were curious about the patient's case and wanted to understand it deeply.

However, their responses showed that, although they are aware of their expected roles and appreciated the importance of them, they had difficulty in adapting to them. They found it difficult to deal with uncertainties and unknowns. They wanted more teacher participation and guidance. They suggested that the teacher should provide answers to their questions and that brief lectures could be integrated into the PBL sessions.

### Discussion

Results revealed that PBL instruction caused a significantly better acquisition of scientific conceptions than the traditional instruction. PBL students appeared to be more proficient in the use and organisation of relevant information, in construct-

**Table 3.** Student opinions about PBL

	Agree (%)	Undecided (%)	Disagree (%)	Mean	SD	Range
PBL helped me learn to obtain information from a variety of sources	83.4	13.3	3.3	4.13	0.90	1-5
I am comfortable with working in groups	80.0	16.7	3.3	4.37	0.89	2-5
I feel comfortable sharing information with others	93.3	3.3	3.3	4.33	0.71	2-5
I feel comfortable in asking help from others	83.3	6.7	10.0	3.77	0.68	2-5
I can evaluate new information and reassess my knowledge	93.4	3.3	3.3	4.17	0.65	2-5
If given an opportunity, I would like to take another PBL class	40.0	43.3	16.7	3.37	0.93	2-5
I have a good understanding of basic principles and concepts	86.7	6.7	6.6	3.77	0.68	1-4
I feel that I can apply the general principles I learned to other topics	83.3	16.7	0.0	3.83	0.38	3-4

ing knowledge and moving toward better conclusions.

However, based on the mean scores, it seemed that the difference between PBL students and students in the control group was not apparent on the items requiring simple recall.

These findings were in agreement with the literature. In their meta-analysis, Dochy *et al* (2003) showed that students in PBL has slightly less knowledge, but remembered more of the acquired knowledge and applied it more efficiently. Moreover, they reported that the effects of PBL are moderated by the way the knowledge and skills are assessed. Similarly, in the current study PBL students outperformed on the items requiring higher order thinking skills and could better use relevant information in addressing the problems, interpret information and use the principles to judge objectively. In fact, Krynock and Robb (1996) stated that PBL does increase higher-level thinking skills by requiring students to think about a problem critically and analyse data to find the solution. Nowak (2001) reported that the PBL increases critical thinking skills, problem solving skills, and decision-making skills. According to Karabulut (2002), PBL creates an environment in which students actively participate in the learning process, take responsibility for their own learning, and become better learners in terms of time management skills, ability to identify learning issues and ability to access resources.

Actually, what makes PBL different from other instructional strategies in the development of these skills is that it places students in the centre of an authentic, ill-structured problem with no one right answer (Sage, 1996). The problem stimulates students to carry out investigations to satisfy their needs to know, then link the new knowledge into their thinking and decision-making processes (Gordon *et al*, 2001).

As pointed out by Savery and Duffy (1995), in PBL the focus is on learners as constructors of knowledge, in a context similar to that in which they would use this knowledge. They are encouraged to think both critically and creatively and to monitor their own understanding.

Social negotiation of meaning is an important aspect of group process. The learners have the ownership of the problem and all of the learning occurs as a result of consideration of the problem. Facilitation is focused on meta-cognitive processes. Therefore, PBL allows students to interact with their environment and with their peers; in a typical PBL class, students work in groups cooperatively which allows evolution of knowledge through social negotiation. The ill-structured problems posed lead students to apply their newly constructed knowledge and to take alternative points of views and strategies into consideration. These properties of PBL may have caused better academic achievement and performance skills when compared to traditional instruction.

## Educational implications

This study provides evidence to support the claim that student-centred classrooms – in which students work on open-ended tasks cooperatively by identifying knowledge deficiencies, generating appropriate learning issues, accessing different resources, and monitoring understanding – lead to the development of lifelong learning skills. Therefore, it is suggested that instructional methods promoting high level cognitive processing such as PBL should be integrated into the curriculum.

Since the teacher plays a vital role in the implementation of such instructional methods – as a coordinator of activities,

as a model of an expert learner, as a facilitator, and as an evaluator (Cooper, 2002) – they should undergo extensive training. Moreover, implementation of PBL or other student-centred methods should start at earlier grade levels so that cognitive and meta-cognitive learning skills, time and environment management skills, and critical thinking skills begin to develop at an early age. In this way, students become more proficient, for example, in accessing and using different resources when they are at secondary school. Classrooms should be designed so that students can work in groups effectively, and they can access different resources such as books, educational CDs, and a computer with internet connection.

In this study, during implementation, most of the students indicated that they had difficulty in making use of a variety of resources due to the overloaded curriculum. However, if they were used to doing out-of-class searches, or if there were more resources available for them in the school library, it would be easier for them to access different resources and to make use of them.

Since the effects of PBL are moderated by the way knowledge and skills are assessed, assessment strategies in appropriate alignment with the PBL should be used.

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#### Appendix . Sample items from the multiple-choice test

- One would expect to see an increased volume of urine formation following:
  - a rise in ADH secretion
  - a fall in plasma volume
  - an increase in plasma osmolarity
  - severe sweating
  - inhibition of tubular sodium reabsorption
- In the kidney, movement of substances from the filtrate into the blood capillary is termed:
  - tubular reabsorption
  - autoregulation
  - glomerular filtration
  - micturition
  - tubular secretion

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